Engineering Library

AUG 12 1916
UNIV. OF MICH. LIBRARY

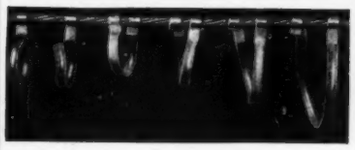
Telephony.

THE AMERICAN TELEPHONE JOURNAL

PUBLISHED EVERY SATURDAY.
TELEPHONY PUBLISHING COMPANY.
VOLUME 71, NO. 7.

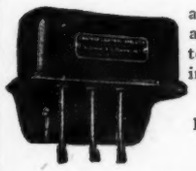
CHICAGO, AUGUST 12, 1916.

SINGLE COPIES, 10 CENTS
YEARLY, U. S. A., $3; CANADA, $4;
ALL OTHER COUNTRIES, $5

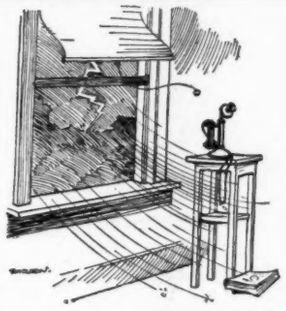


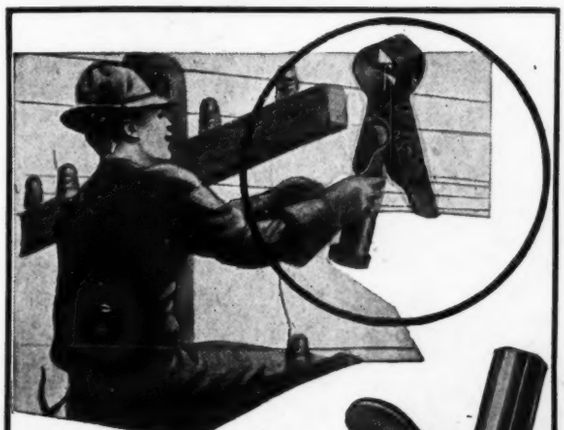
CAMERON
Aerial Cable Rings
(Patented)
6 SIZES—7 STYLES
A "special" ring for every cable and condition
Ring Construction Booklet on Request
Cameron Appliance Co.
38 Waters Ave. Everett, Mass.

EVERSTICK ANCHORS
You will go around in a circle, if you are looking for a better anchor than the EVERSTICK—there's a reason.
Write for Literature.
Everstick Anchor Co.
St. Louis, Mo.

Automatic Lightning Protection
Chapman Arresters

are self cleaning and require no attention after erecting.
Used whereever lines are run.
Manufactured by
MINNESOTA ELECTRIC CO.
MINNEAPOLIS, MINN.

Telephone Cables
ALL SIZES AND CAPACITIES
Hard Drawn Copper Telephone Wire.
Galvanized Iron Telephone Wire.
Siemens-Martin and High Strength Strands.
AMERICAN ELECTRICAL WORKS
PHILLIPSDALE, R. I.
CHICAGO—112 W. Adams St.
CINCINNATI—Traction Bldg.
NEW YORK—165 Broadway


More Work for the Trouble Man
Unless It's a
"RAVEN BRAND"
Moisture Proof Cord
Supply Sales Department
Automatic Electric Co.
Chicago, Ill., U. S. A.
Makers of 600,000 Automatic Telephones
We Have Branches in
New York, N. Y.—46 W. Broadway
Toledo, O.—Second Nat. Bk. Bldg.
Buffalo, N. Y.—332 Ellicott St.
Boston, Mass.—Tremont Bldg.
Detroit, Mich.—Ford Bldg.
Pittsburgh, Pa.—First Nat. Bk. Bldg.
Philadelphia, Pa.—Bourse Bldg.
St. Louis, Mo.—Syndicate Trust Bldg.


HOOK UP! In 10 Seconds With a
Frankel Testing Clip
MAKERS OF THE BEST ONLY
FRANKEL
CONNECTOR CO. INC. N.Y.
733 Broadway, NEW YORK CITY
or Western Electric Company, All Branches

American Steel & Wire Co.'s
W. & M.
TELEPHONE WIRE
AMERICAN STEEL & WIRE CO.
Chicago New York Cleveland
Worcester Pittsburgh Denver

CEDAR POLES
Wire or write for delivered prices
NATIONAL POLE CO.
ESCANABA :: :: MICH.

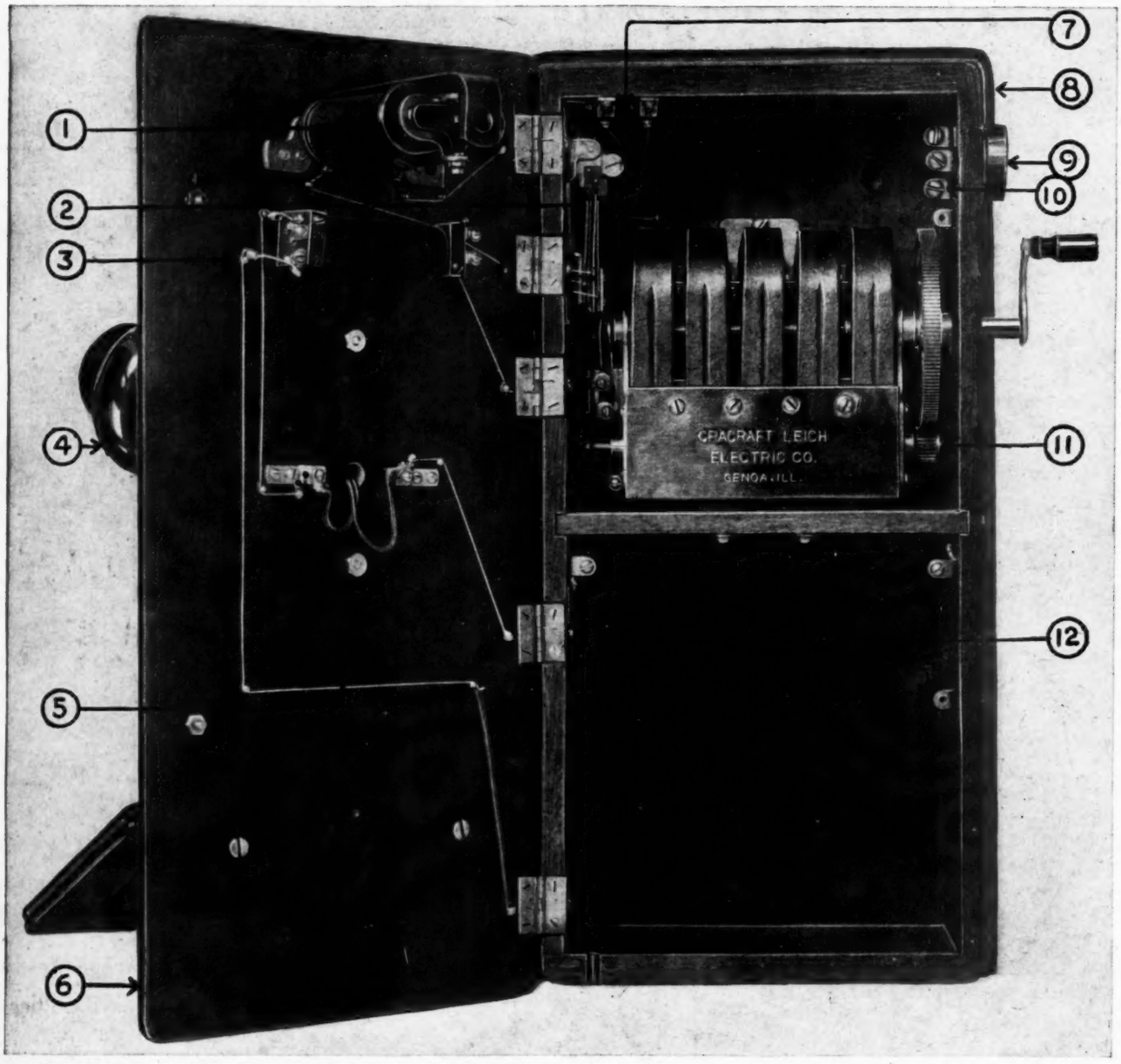
"Cope"
Underground Specialties
Complete Catalogue on Request
T. J. Cope
1620 Chancellor St.,
Phila., Pa.

MATTHEWS SCRULIX ANCHORS
Over 125 jobbers carry a stock of them in the U. S. and Canada
ARMCO→ ←RODS
DOUBLE LIFE

Look for On the Helix
208 page hand book on request
W. N. Matthews & Bro., Inc.
St. Louis, Mo.

TWELVE REASONS WHY YOU SHOULD USE THIS TELEPHONE

The latest evolution of the Compact Type Magneto Telephone is here shown. This new design has been brought out to give you the **smallest,** most **accessible, convenient, reliable** and **durable** Magneto Telephone. Make this instrument your standard. **Let us send you one for trial or examination.**



1. No. 1-A RINGER, polarized and self contained with eccentric gong adjustment. Armature will not stick and can be given any desired adjustment by turning a single screw.

2. HOOKSWITCH has springs mounted vertically, will not catch dust and made of the best of materials. Special spring provided to actuate hook which is not dependent on the contact springs for its operation. Hook easily removable.

3. No. 1-A INDUCTION COIL, mounted on door where you can get at it. Quickly removable. Has combined solder and screw terminals.

4. No. 1-L TRANSMITTER, high resistance, low battery consumption. Back cup drilled to interchange with any other arm. TRANSMITTER ARM, short type, makes it possible to mount telephone in small space.

5. No. 3-A CONDENSER can be connected here. The addition of a condenser in the receiver circuit of telephones on a party line makes it possible to ring out on the line regardless of the number of receivers off the hooks.

6. DOOR opens to the left—a convenience to the installer in that generator can be operated with door open and all tests properly made.

7. RECEIVER CORD TERMINALS are placed where they can be gotten at and do not interfere with other parts. Either pin or spade tips can be used with these terminals.

8. CABINET of finest kiln-dried first grade oak, tongued and grooved. Hand-rubbed dull varnish finish throughout. Selected from many finishes as being the most suitable and durable for the wear given a telephone.

9. LIGHTNING ARRESTER which really protects—has specially large surface. Mounted on side of cabinet where opportunity of shorting line is small.

10. LINE TERMINALS, good size—mounted inside—no chance for putting telephone out of commission by using top of telephone as a shelf.

11. No. 5-A GENERATOR, compact, powerful, high voltage—will ring your bells under most severe conditions. Well supported in the cabinet and quickly removable.

12. CABINET WIRES are NOT soldered to hinges but connected to the phosphor bronze spring of the hinge in such a manner that we are able to guarantee indefinitely these hinge connections. Very little wiring concealed—no loops or loose wire used. This neat method of running circuit wires from door to interior of cabinet is patented by us, and therefore only found on our telephones.

DISTRIBUTORS { ELECTRIC APPLIANCE COMPANY
CHICAGO DALLAS NEW ORLEANS SAN FRANCISCO
ST. PAUL ELECTRIC COMPANY, 316 ROBERT STREET, ST. PAUL, MINN.

CRACRAFT, LEICH ELECTRIC COMPANY

Factory and Main Office, GENOA, ILL. **Western Branch, KANSAS CITY, MO.**

Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Telephone Weekly, Telephone Magazine, Telephone Securities, The Telephone, Sound Waves

PUBLISHED WEEKLY BY THE TELEPHONY PUBLISHING COMPANY
MONADNOCK BLOCK, CHICAGO

H. B. McMEAL, President and Editor. H. D. FARGO, Secretary and Treasurer. J. C. KELSEY, Vice-President and Financial Editor.
S. R. EDWARDS, Managing Editor. J. R. HASTIE, Vice-President and Advertising Manager.

Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1897

Volume 71
Number 7

CHICAGO, SATURDAY, AUGUST 12, 1916

Subscription—10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada; $5 Other Countries

Bill the Troubleman says:

"Quite often we have to do things which we do not like to do but which are for our own good. That is the way the breaking of the Bell-Western Electric combine looks to me."

The Bell and Government Ownership.

It is a significant fact that as soon as the danger of a general railroad strike loomed up on the business horizon, the talk in favor of government ownership of railroads was revived and seemed to receive more serious and favorable attention than ever before. This is not strange. If the men who manage the railroads and the men who operate them cannot get along together without involving the public in the terrible situation which would follow a paralysis of the transportation facilities, it is only natural—whether the theory is right or wrong—to say: "Let the government take over the job."

There is a lesson here which the Bell telephone company should heed. If the Bell managers will not run their business with a decent regard for the rights of their competitors, the Independents, there will be the same solution—government ownership.

The railroads are given a square deal by the people of the United States when the railroads give the people a square deal. If the facts show that the roads are entitled to higher rates in order to give service and earn a fair return on the money invested, they are granted such rates. But when dishonest financing and unfair competition, waste of stockholders' money, and niggardly treatment of employes characterize a railroad's policy, that road is likely to get scant mercy from the people, for it deserves no more.

If the American Telephone & Telegraph Co. desires government ownership and operation of long distance telephone lines, it needs only to continue the practices which have been bitterly complained about in years past. Its alliance with the Western Electric Co., with all its consequent unfair competitive policies, is likely to prove a stepping stone to government ownership of the long distance telephone lines.

Advocates of government operation of the railroads point out that the vast railroad interests of this country are dictated by a comparatively few men in Wall Street. The statement has been made that 148 railroads are controlled by 65 directors who, in turn, owe allegiance to 16 banks which are under the domination of three Wall Street combinations. No wonder such a condition arouses the hot resentment of the masses of the people and lends strength to a proposal to take over such an all-important public utility and operate it in the interest of the whole nation.

What is true of the railroads is equally true of the Bell telephone situation. Entrenched behind the financial bulwarks of Wall Street, the Bell interests have been waging a war of unfair competition against Independent telephone operators and manufacturers. When hard pressed by the protests of those injured, the Bell has come forward with fair words and has promised reform, only to re-commence its monopolistic tactics as soon as the pressure relaxed. Blinded by the mistaken idea that it is entitled to a monopoly of all the telephone business of the country—manufacturing as well as operating—the Bell is actually playing into the hands of the advocates of government ownership.

The Independent telephone men of this country wield a tremendous political influence. If they reach the conclusion that the Bell means to violate all principles of fair play, they can do much to place the government in charge of the long distance business. The Bell has spent much money trying to direct public opinion away from government ownership. Fair treatment of its competitors would effect more in that direction.

Officious Little Officials

By HERBERT KAUFMAN

You consider yourself an important person because your position occasionally permits you to annoy important people—but so can a gnat, a rusty hinge, a rattling window, and other minor bothers. Impudence is a smart aleck's conception of impressiveness—a backstairs' notion of "big folks" behavior. An upstart betrays himself by the manner he displays his authority.

Those who aren't accustomed to the use of power invarably abuse it. Insolence is the snarl of the insignificant; "big head," the evidence of a small one. Little men are always the greatest bullies. You merely show up when you show off. We all know just about what your job pays and therefore how much intelligence it demands, so why bluff?

Office boys, bell hops, and cash girls may possibly mistake your impertinence as a manifestation of superiority, but the public recognizes the ass in the ill-fitting lion's skin.

You're a failure and what's more, you show it. You realize you haven't brains enough to become somebody, and think that pomposity will blind others from the discovery that you're nobody. You've reached your level—you've quit trying. If you had ambition or ability, common sense and calculation would make you courteous, obliging and patient. You'd take advantage of every possible occasion to gain well-wishers for yourself and strengthen the cordial relations between your employers and their patrons.

Good will is the chief asset in business, and those who advance it simultaneously, advance themselves. Neither corporations nor merchants have room for surly servants nor shallow-brained clerks. But wherever a man demonstrates a capacity for judgment and tact, no matter how menial his beginnings, there isn't a door in the organization to which he doesn't carry a pass key—not an office to which he is ineligible. It's the individual, not the start that counts at the end.

Exercise your smile muscles. Begin to grin and win. Good nature is a timesaver. One grouch incites another. Soft salve saves many a minute and dollar. Headquarters always hear the creak in the machine and soon locates the source of the trouble.

The more we analyze the essentials of success, the more consideration we pay to complaints against employes. They warn us where we are weak.

Once we resented kicks and criticisms—took 'em, in a measure, as accusations against ourselves and tossed them aside with the reflection that there was "no profit anyhow in catering to cranks and kickers." But we have since learned better. Every ill wisher is a hostile force—an active microbe infecting the confidence of a long string of friends and relatives.

We lose millions of dollars annually through the preventable dissatisfactions aroused by the very persons who are employed to abort it. Hotel proprietors indirectly pay bank-president salaries to room clerks so filled with a sense of their importance that their insufferable attitude fills rival hostelries. A pleasant railway journey begins with the gateman—an enjoyable dinner with an ingratiating head waiter—a satisfactory purchase with an attentive floor walker.

Public service corporations groan at the deficits occasioned by blockheads who can't seem to understand that snappiness and listlessness reduce both earnings and their own pay envelopes.

It takes twice as good a show to please the man who has just had a row at the box office.

Copyright, 1916, by Herbert Kaufman.

The High Frequency Output of Telephone Transmitters

Discussion of the Efficiency of Telephone Transmitters as Affected by Their Design and Circuit Conditions—Effect of Impedance on Power Transfer—High Resistance Transmitters—Advantages of High Power Factor—First Installment

By E. W. Kellogg

The function of the telephone transmitter is to supply a high frequency current which will carry speech with the greatest possible clearness and loudness.

Objects to be Attained in Transmitter Design.

For clearness, the transmitter should work equally well for all frequencies. In other words, it should not give rise to a stronger current for a sound of one pitch than it does for an equally loud sound of any other pitch. This condition, however, cannot be fully realized, and the degree of inequality is a measure of the distortion. Distortion introduced at one point may or may not be compensated for by distortion of an opposite kind elsewhere.

For loudness, the *energy* in the high frequency currents produced by the transmitter should be the maximum possible. The magnitude of the current by itself, or of the voltage by itself, has little significance. But the combination of the two, or the power supplied by the transmitter in the form of high frequency currents, is an indication of the effectiveness of the transmitter, for it is the power transmitted and delivered to the receiver which is converted into sound waves.

The power output of the transmitter depends upon the average transmitter resistance, the total variation of resistance which a given sound will produce, the direct current supplied by the battery, and the impedance which the circuit offers to the flow of the high frequency current.

It will be well to take up the question of the effect of impedance first, assuming the other factors to be constant for the time being. It is necessary, in such a discussion, to consider one frequency at a time, since the circuit impedance is different for different frequencies.

Transmitter Output as Affected by Circuit Impedance.

In Fig. 1 are shown the results of a test to determine the relation between the impedance of the circuit to alternating current and the transmitter output. The apparatus was arranged as shown in Fig. 2. The transmitter was supplied with a constant battery current and its diaphragm was actuated by attaching a small piece of iron, and sending a constant high frequency alternating current through the windings of a receiver magnet placed close to the iron. A resistance box was used for load, and the high frequency current supplied by the transmitter was read by means of a thermo-galvanometer.

In this test as the curves show, the current fell rapidly and the voltage rose as the load resistance was increased. The power output reached a maximum when the load resistance was about equal to the transmitter resistance.

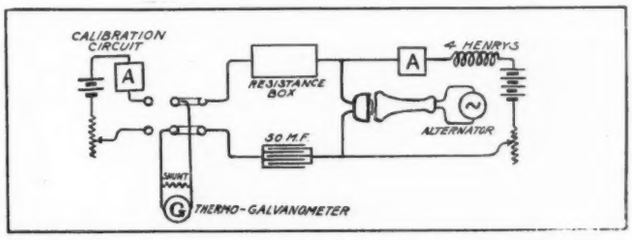


Fig. 2. Arrangement of Equipment for Transmitter Test.

The test also showed that the characteristics of the transmitter are those of a constant alternating voltage, supplying the load through a fixed resistance, namely the average resistance of the transmitter itself. This total voltage, calculated by multiplying the current by the total resistance of transmitter and load, is shown in curve *D* of Fig. 1 and is seen to be nearly constant. The voltage available for the load is less than this by the amount of the resistance drop in the transmitter.

Fig. 3 shows the relation between the current and the load or terminal voltage. This characteristic would be expected from purely theoretical considerations. In the foregoing discussion the current and voltage referred to are the alternating components only. The *total* voltage across the transmitter, and the current through the transmitter are fluctuating, never actually reversing, and are equivalent each to a constant average value plus a small alternating component. At any instant the total voltage across the transmitter is equal to the total current multiplied by the resistance.

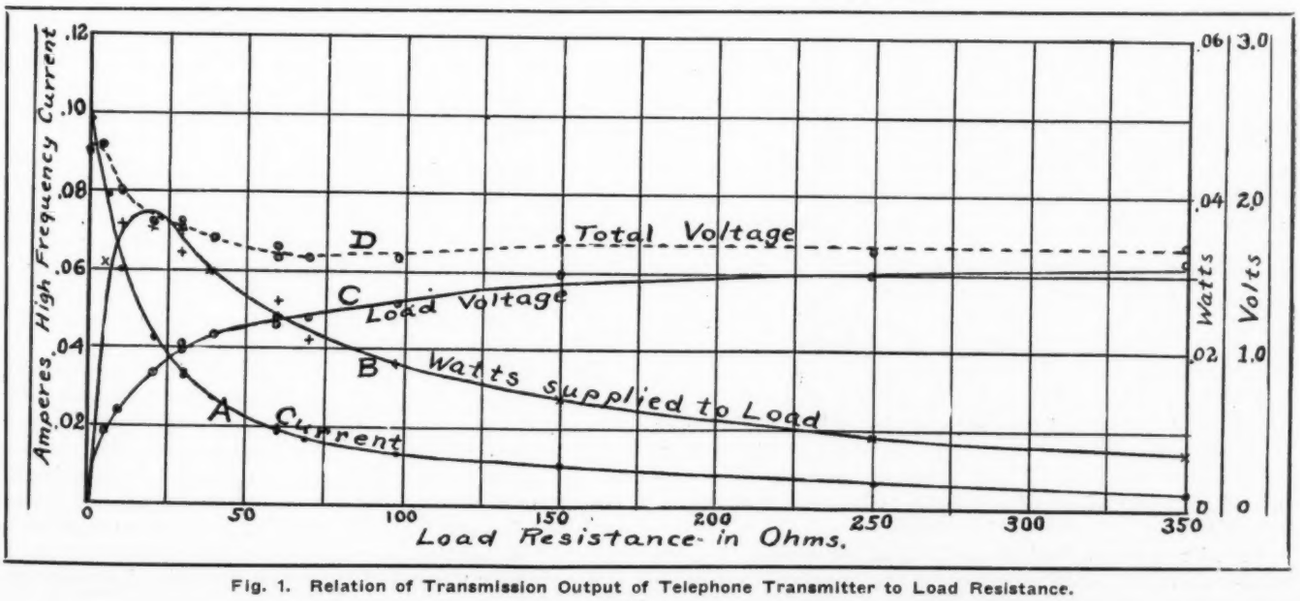


Fig. 1. Relation of Transmission Output of Telephone Transmitter to Load Resistance.

If the load circuit is open, the current will be held practically constant by the choke coil, and the variations in voltage will be maximum. If on the other hand, the current is permitted to fluctuate, which happens when the load circuit is closed, it will be least when the resistance is highest, and greatest when the resistance is low. Therefore the potential which is the product

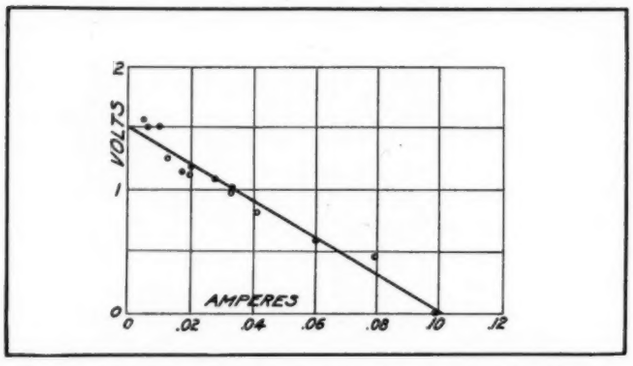


Fig. 3. Relation of Voltage to Current in Transmitter Tested.

of the two, will fluctuate less than when the current is maintained constant. In other words, the greater the fluctuations of the current, the less will the voltage fluctuate; or the greater the alternating component of the current, the lower will be the alternating component of voltage at the terminals of the transmitter.

The transmitter might be compared to an alternator with a large voltage regulation. The curve of load voltage plotted against load current for such a generator would have the form shown in Fig. 3. Loading up a generator consists in reducing the impedance of the circuit to which the generator is connected. This results in increased current and increased power output. But if the voltage at the terminals of the generator falls rapidly as the current is increased, a point is presently reached beyond which further reduction of the impedance of the external circuit results in less power output, because the increase in current is no longer sufficient to compensate for the loss of voltage. If the drop in voltage is due entirely to internal resistance, the point of maximum power is reached when the external load impedance is equal to the internal resistance.

Impedance Equality for Maximum Power Transfer.

The principle of impedance equality for maximum power transfer, which finds many applications, especially in the telephone field besides those just mentioned, may be stated in more general terms as follows:

Whenever a given voltage is sending current through a circuit containing a fixed impedance and a variable impedance of constant power factor, the latter will receive the maximum power if made equal to the fixed impedance.

Thus a transmitter will supply the maximum power if connected to a circuit of impedance equal to the transmitter resistance. If it is necessary to have other apparatus in series with the transmitter, this will alter the fixed impedance and a different value of the adjustable impedance will be necessary if the latter is to absorb the maximum power possible. This maximum power will be considerably less, however, than the maximum that was obtainable before the fixed impedance was increased. A common example of an adjustable impedance of constant power factor is a circuit supplied through a repeating coil. If the ratio of the coil is changed, the impedance on the primary side is changed but the power factor is hardly affected.

A telephone set, as a whole, will put out a greater amount of power in the form of high frequency currents when connected to a line of impedance equal to its own, than if connected to a line of different impedance.

In order to secure the best results from transmitters, it is desirable to adjust circuit conditions so that the impedance to alternating current will be reduced to a value comparable with the transmitter resistance. An exact equality is not important, since a considerable departure from equality, even up to a ratio as high as three to one—the point where one impedance is three times the other—does not cause a very serious reduction in output. This is fortunate, for the same transmitter must work at different times in conjunction with lines of widely differing impedances, and the impedance is not constant even for any one line, but varies with the frequency. Moreover, the impedance at the transmitter terminals cannot be reduced below a certain point without sacrificing the qualities of the telephone set from a receiving standpoint. Thus, in practice, transmitters will be found working against impedances differing over a wide range, but in general considerably in excess of the transmitter resistance.

In the problem of impedance equalization, all apparatus or circuits affected must be considered together and numerous aspects of the case taken into account.

Use of an Induction Coil to Change Impedance.

The effective impedance of a circuit can be changed by supplying current to it through an induction coil instead of directly. If it is desired to work the transmitter against a lower impedance, a coil is used with more turns on the line side than on the transmitter side, so as to step up the potential. This enables the transmitter to supply a larger current at low potential or, in other words, offers a low impedance to the current from the transmitter.

If a line has an impedance of Z ohms, the introduction of a coil having N times as many turns on the line side as on the transmitter side, will reduce the impedance to $Z \div N^2$ ohms, approximately. To send i ampere into the line will require $Z \times i$ volts on the secondary side of the coil. On the primary side, neglecting the losses in the coil, the voltage will be $Z \times i \div N$ and the current $N \times i$, which makes the ratio of voltage to current or the impedance

$$\frac{Z \times i}{N} \div (N \times i) = Z \div N^2$$

Thus if a line shows an impedance of 1,000 ohms, and an induction coil with 500 primary turns and 1,500 secondary turns is introduced, the transmitter would only have to operate against an impedance of $1{,}000 \div 9$ or 111 ohms. Losses in the windings of the coil might increase this to 130 ohms, but there would still be a decided gain.

High Resistance Transmitters.

The resistance of transmitters in ordinary use ranges from 15 to 40 ohms. Line impedances are likely to run all the way from 200 to 2,000 ohms. Since equality of impedance has been seen to be advantageous, the question will naturally be raised whether as an alternative to reducing the line impedance by means of an induction coil, it would not be possible to use higher resistance transmitters.

The simple addition of resistance to the transmitter results in outright loss, but if at the same time that the resistance is increased, the *variations in resistance* resulting from a given sound are increased proportionately, or in other words if the high resistance transmitter gives the same percentage variation in resistance as the low resistance transmitter, then it will be capable of supplying the same amount of energy at a higher potential, and the desired end will be attained.

Let us compare, for example, a transmitter whose resistance varies between 9 and 11 ohms, with one whose resistance varies between 36 and 44 ohms. If the first can carry a battery current of ½ ampere without overheating, the second could carry ¼ ampere, assuming the two transmitters capable of dissipating the same amount of heat. For comparison, the voltage and current each would supply to a circuit having a resistance equal to its own will be calculated.

Figuring the alternating current on the basis of (battery cur-

rent) × (variation in resistance above and below average) ÷ (total resistance of transmitter and load), we have for the low resistance transmitter, ½×1÷20=1/40 ampere and, since the load is 10 ohms, the load voltage would be ¼ volt. In the case of the high resistance transmitter, the current is ¼×4÷80=1/80 ampere. The voltage across the 40-ohm load is 1/80×40=½ volt. Thus the high resistance transmitter gives twice the voltage and one-half the current of the low resistance transmitter.

The transmitter resistance can be increased (1) by decreasing the diameter of the chamber of granulated carbon, (2) by increasing the distance between the front and back electrodes, (3) by using finer granulated carbon, and (4) by using two or more chambers of granulated carbon connected in series.

Decreasing the diameter of the carbon chamber causes an increase in the resistance variations, but it reduces the amount of heat that can be carried away and thereby reduces the capacity of the transmitter.

Increasing the depth of the carbon chamber, or using finer grains of carbons do not increase the variations in resistance as much as they do the average resistance, so that a limit to the advantage that can be gained in these ways is quickly reached.

Several chambers of carbon may be connected in series and the variations in resistance for a given diaphragm movement are increased in the same proportion as the average resistance. The heat dissipating capacity of the transmitter is also likely to be increased by the use of several chambers. The multiple chamber transmitter, however, has found only a limited field of use on account of its complexity and cost and the fact that a part of the advantage gained in high resistance is generally lost by adding to the weight of the moving parts and thereby reducing the movements of the diaphragm as well as increasing distortion.

Moderately high resistance transmitters (40 to 50 ohms) of the single chamber type, have found considerable favor, especially for common battery systems. An advantage of the high resistance transmitter which is generally of more importance than the one just discussed, is that it requires less battery current and is therefore less affected by high resistance in the subscriber's loop through which it is supplied from the central office.

Advantage of High-Power Factor.

We have seen that in order to receive the maximum amount of power, a load circuit should have an impedance equal to the fixed impedance in the supply circuit. (The term "load circuit" is used here to designate the circuit or apparatus to which the power is being supplied.) This is on the assumption that the power factor of the load circuit is fixed. It is possible, however, in many cases to control the power factor of the circuits as well as the magnitudes of their impedances, for the reactance due to capacity is opposite to that due to inductance, and the two may be made to neutralize. It is therefore in order, to inquire as to the effect of changing the power factor of the load circuit.

Practically all telephone equipment or circuits have a fairly definite impedance and power factor at any given frequency, and are therefore electrically equivalent to a load consisting of a certain amount of resistance and either inductive or capacity reactance. It is convenient in discussions of this kind to use the term "effective resistance," or "equivalent resistance," as meaning that part of the load impedance which consumes voltage in phase with the current, or which represents power consumption. Effective resistance $=Z \cos \theta$, in which Z is the total impedance of the load circuit, and θ its power factor angle.

The value of the current supplied to the load depends upon the total impedance of the supply and receiving circuits in series, If there is any reactance in either circuit, the total impedance exceeds the resistance component alone. Therefore, if the reactance can be eliminated or neutralized without affecting the resistance, the total impedance will be reduced and the current increased. The power is equal to the square of the current multiplied by the effective resistance of the load and, since the latter was assumed to be unchanged, the increase in current means an increase in power. For maximum power transfer then, the total reactance of the supply and receiving circuits should be as low as possible.

Reactance in either circuit which cannot be eliminated may be neutralized by reactance of the opposite kind placed in either circuit. For example, if a telephone set is connected to a cable line which has a capacity characteristics—i. e., may be electrically imitated at any given frequency by a resistance and condenser in series—the conditions for either transmitting or receiving are best if the telephone set has an inductive reactance equal to the capacity reactance of the line. This is true at least with respect to waves of the particular frequency for which the reactances balance. For other frequencies there may not be a complete balance, and although there is a gain from the use of one reactance to offset the other, it is less than for the frequency at which there was a balance.

More favorable transmission conditions for some frequencies than for others, in general, give rise to distortion, so that efforts to neutralize reactance may in some cases fail to result in any benefit to speech transmission, although it should increase the average loudness of the sounds received. The benefit or detriment depends on the degree of distortion and whether the distortion is such as to offset or to augment other distortion in the system.

(To be Concluded.)

Cobwebs Cause Wire Trouble in Argentine.

Telegraph and telephone wires in Argentine, South America, are at certain seasons of the year subject to a partial or almost entire interruption, owing to the prevalence of spiders' webs, known colloquially as Devil's Beard. These, says J. W. Stubbs in the Post Office Electrical Engineers' Journal, cover the wires for a distance of many kilometers and as soon as the sun sets, become saturated with moisture, causing contacts between the various conductors.

The webs themselves are like gossamer threads, but are in such abundance that as much as five kilogrammes in weight have been swept from a line of four wires over a distance of ten kilometers. When swept together, the webs have the appearance of a kind of grey cotton waste, which will not flame up when lighted but smolders for a considerable time.

The trouble is so serious that the Argentine government addressed a circular to the different telegraph administrations all over the world to ascertain if anything similar was experienced elsewhere, and, if so, the means taken to counteract it. The replies received showed that in no country outside of South America was anything of a like nature met with.

The phenomenon of these spiders' webs was noticed long before the days of telegraphy in South America, and Charles Darwin, in his Journal of Researches (Chap. VIII, page 165, edition 1910), tells about them.

Mr. Stubbs who is superintending telegraph engineer on the Buenos Aires & Pacific Railway has made a somewhat exhaustive study of the matter since 1909. The results of his inquiries show that the spider appears to travel from the north and east of a line drawn from Buenos Aires to Villa Mercedes. The Pacific Railway runs practically east and west across the continent. The telegraph wires are mostly affected between Buenos Aires and Alberdi, 206 miles (331 kilometers), and in a much less degree from there to Villa Mercedes 425 miles (685 kilometers) while from the latter point of Mendoza, 650 miles (1,045 kilometers), the wires are untouched by the webs.

Through the courtesy of the Argentine Meteorological Office a careful examination was made of the direction of the prevailing wind for the years 1913-14-15. It was

found that during those years the wires were almost totally interrupted on 153 occasions, and that on 118 of these, the wind was from the north or east.

Strong winds and heavy rains will free the wires to a large extent from the webs. Even when the weather is calm and there is but slight moisture at night, the webs cause but little trouble. Unfortunately, owing to the immense area of the River Platte and the shallowness of its waters, evaporation is very great, and the resulting dew at night causes the webs to become saturated with moisture, so that from March to September in each year there is always more or less trouble from contact between wires.

Heavy rains prevent the migration of the spiders and help to clear the wires of the webs. In dry years, like 1909 and 1910, the cobweb trouble was at its maximum, but in 1914, which was a very wet year, there was a minimum of disturbance.

Another interesting point is that the webs are carried horizontally, so that in most cases it is the wires on the same arm that are put in contact one with another. The wires of the Pacific Railway suffer most between Manzanares and Chacabuco. Daily records, kept over a period of several years, show that the contacts are almost invariably between the same groups of wires.

The wires on the lower arms of the poles rarely suffer. This is probably due to the fact that, being level with or below the tops of hedges, shrubs, etc., the webs are caught before they reach the wires. The poles along the railway in the section mentioned are on the south side so it is possible that if there were a row of high trees growing on the north side along the section affected, the telegraph wires would escape the webs.

Across the vast plains, where there is scarcely a tree to be seen, the only remedy appears to lie in the use of covered wire, but this would entail a very heavy outlay. At present, when the trouble is most acute, the only thing to be done is to work the wires in short sections with the resulting re-transmissions and delays, and reduce the battery power to a minimum, using repeaters where possible.

The Argentine government has tried the experiment of sweeping the wires, only to find that in a couple of days they are as thickly coated as ever. It is easily possible to collect many sacksfull of the web, and it is possible that before long some commercial value may be found for it.

German Operation of Belgian Telegraphs and Telephones.

Some interesting information on the position of telegraphs and telephones in Belgium as at the middle of February, 1916, is given in The Telegraph & Telephone Journal from a semi-official German publication. The Belgian Telegraph Administration, before departing had naturally taken good care to leave the telegraph and telephone system in as useless a condition as possible, and the Germans had no easy task in restoring a limited system of communication for military and hospital needs.

Plans and records were either removed or altered so as to give rise to short circuits or false connections. Many of the cables and wires were damaged either purposely or owing to the exigencies of war, and long sections of the routes were in indescribable confusion. The apparatus was in many cases destroyed altogether or rendered unusable by the removal of parts. The apparatus room of the chief telegraph office in Brussels was so devastated that it was necessary for some time to employ a temporary office with new apparatus.

In Antwerp, when the Germans took possession of the head office two days after the fall of the fortress, it is stated that they were able to rectify the false connections at once, and traffic was thenceforth resumed without disturbance. In a comparatively short time, the larger offices at Brussels, Antwerp, Liege, Ghent, Charleroi, and Verviers were in full working order. The telegraph traffic between Brussels and Germany was said to be very heavy, and the Siemens rapid telegraph system was brought into use in order to deal with it. Private installations necessary for police, fire, water, tramways, gas, electrical, and similar purposes were restored, some 50 private systems being permitted by the general government.

Telegraph and telephone lines have been restored up to a length of about 8,000 kilometers of wire, and about 5,700 km. of aerial routes, mostly along the principal railway lines. The telegraph system is divided into 27 districts; 58 telegraph offices are available for public traffic, and 521 exclusively worked by the military provide for military and governmental needs. Two sets of Siemens rapid telegraph apparatus as well as numerous Hughes type-printers, sounders, and Morse instruments are in use.

Private telegrams of a pressing nature with an unlimited number of words are allowed in German, Flemish, or French at a charge of 1 fr. for every ten words, excluding the address. Telegraph traffic is permitted between certain places in Belgium and Germany in German and French, but from Germany to Belgium only in German. Information about troops, military or naval movements is forbidden. The private telegraph traffic has developed favorably, amounting within Belgium to a monthly total of over 20,000 telegrams.

The Belgian people are not so fortunate with regard to telephones. It is said that private telephone traffic is not "yet" permitted. The number of telephones, which was probably 50,000 before the war, is now 4,700, of which 1,800 are in Brussels. It is assumed by the English telephone officials that this number only serves the host of German officials, military and civil.

The telegraph and telephone staff is, of course, entirely German, and consists of about 280 officials, 80 officers of lower rank, and 320 telegraphists, besides a number of military aids.

New Members of the A. I. E. E.

In the July Proceedings of the American Institute of Electrical Engineers, P. G. Burton, of Baltimore, Md., engineer of the Chesapeake & Potomac Telephone Co., is reported to have been recommended for transfer to the grade of member at the last meeting of the board of examiners.

The following telephone men are included in the list of new associate members: A. G. Chapman, New York, electrical engineer, American Telephone & Telegraph Co.; L. S. Crosby, Atlanta, Ga., division plant engineer's office, American Telephone & Telegraph Co.; V. A. Davison, New York, foreign sales department, Western Electric Co.; A. W. Drake, New York, assistant general superintendent of plant, American Telephone & Telegraph Co.; C. L. Howk, New York, telephone engineer, Western Electric Co.; L. R. Jenney, New York, division plant superintendent, American Telephone & Telegraph Co.; W. J. Mackay, Seattle, Wash., switchboard man, Pacific Telephone & Telegraph Co.

T. G. Miller, Chicago, division plant superintendent, American Telephone & Telegraph Co.; F. A. Stevenson, New York, general plant superintendent, long lines department, American Telephone & Telegraph Co.; H. B. Stimson, New York, traffic engineering department, American Telephone & Telegraph Co.; E. C. R. Stoneman, Montreal, Quebec, power inspector, Bell Telephone Co. of Canada; E. Weller, New York, engineering department, New York Telephone Co., and J. M. Wilson, New York, engineer, Western Electric Co.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

447. What equipment is required by the operating conditions of the switchboard that is not actually engaged in making connections between lines?

448. How is the total demand for current made upon the operator's set battery kept at a minimum?

449. What were the causes that dictated the use of one common battery in offices having two or more operators' positions?

450. What is battery cross talk?

451. Name some of the properties of standard storage batteries.

452. How does the use of batteries of more than one cell increase the possibility of cross talk in the arrangement shown in Fig. 158?

CHAPTER XX. The Operator's Equipment (Cont'd).

453. *Illustration in early common battery offices.*—The original common battery exchanges comprised, in their power plants, storage batteries working at four voltages. The operators' telephone sets were served by batteries comprising only one large cell for each group of switchboard positions. The nominal voltage of this set was that of one cell—two volts. The line signal lamps were supplied with current from batteries comprising two cells in series. The nominal voltage of this battery was that of two cells in series, approximately four volts.

The supervisory lamp circuit, in which was included the cut-off relay when the plug rested in the jack, was served by a battery comprising four cells in series and having an approximate working voltage of eight. The circuit through the line relay and the battery feed repeating coil windings of the cord circuit, was supplied from a set of storage cells, twelve in number. The approximate working voltage of this set was therefore 24.

This is historically interesting and illustrates the expedients adopted by the early engineers to enable them to make use of the equipment available at the time. The obvious economy of utilizing one battery voltage requiring only one set of charging equipment, however, soon stimulated the development of a high voltage (24) switchboard lamp and an improved arrangement for the operator's set and the other switchboard circuits.

When a switchboard lamp suitable for use with a 24-volt battery was developed, it made possible the use of much simpler charging equipment in the exchange. In the original common battery offices, the use of four different battery voltages required that charging machines to correspond be provided.

Machines for charging at only three voltages, however, were installed in such offices, because the battery for the operation of the line lamps, consisting of two cells and working at four volts, also furnished the current at two volts for the operators' sets. In other words, each one of the two cells of the line lamp battery was utilized for one group of operators'

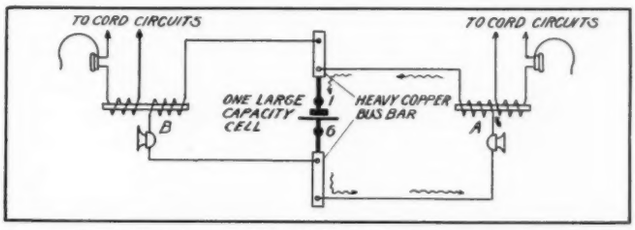


Fig. 158. Two Sets on One Battery Without Reactance Coils.

sets, while the entire battery of two cells in series was employed at four volts to supply the line lamps.

When charging, the two cells of each line lamp battery were charged in series and the unit was handled as one two-cell, four-volt set. The only charging machine required for the two and four-volt batteries was, therefore, one suitable for charging two storage cells in series.

454. *Use of reactance coil in operator's equipment.*—With the advent of the high voltage switchboard lamp and the use of one voltage for the operation of the equipment, it was necessary to provide for only one voltage in the battery charging arrangements. The saving in the investment required for the power plant was very considerable and the switchboard circuits were much simpler.

In sections 449 to 452 inclusive, it has been shown why the use of common battery to supply operating current for two or more operators' sets according to the scheme shown in Fig. 158, requires that the battery voltage be limited to that of one large cell. When a higher voltage single battery is used, such as is the case in modern plants, the principle underlying the arrangement of the operators' sets for current supply is shown in Fig. 159.

The primary circuit of each set is provided with an induction coil as it is in Fig. 158. In addition, each set is provided in the primary part of the circuit with a reactance coil, *M*, and a condenser, *X*. The installation of the reactance coil, *M*, between the battery and the rest of the equipment prevents the fluctuating currents created by the transmitter from passing through to the common battery terminals. This is because the reactance coil, *M*, is so designed as to permit the passage of a steady or very slowly changing current but to absolutely prevent the passage of the rapidly fluctuating currents resulting from the action of sound waves upon the diaphragm of the transmitter.

As the reactance coil, *M*, prevents the passage of the rapidly fluctuating transmitter currents to the common battery, it is clear, since the primary and the reactance coil are in series, that it will also prevent their passage through the primary of the induction coil. In order to relieve this condition and to render the induction coil operative, the condenser,

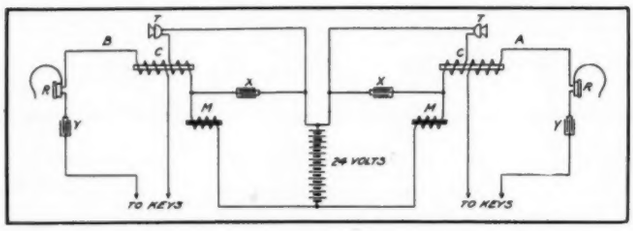


Fig. 159. Simple Operators' Telephone Wiring with Impedance

X, is added and so connected that it is *bridged around* the transmitter and the primary of the induction coil.

455. *Charging voltage of the condenser in the operator's set.*—The operation of the condenser may be very readily analyzed by assuming a reasonable set of conditions and studying the resulting effects. The transmitter, *T*, may be assumed to have a resistance of about 120 ohms when normal. It must be understood that almost every manufacturer produces transmitters which may or may not be of the same resistance as those produced in other factories. In each case, the manufacturer has so designed his coil equipment as to get, presumably, the best results from his own transmitter. It is for this reason that 120 ohms is assigned for the resistance of the transmitter, *T*. It is the resistance of one standard type of transmitter.

The primary of the induction coil will, no doubt, have a resistance of approximately 10 ohms and the reactance coil, in 24-volt plants, a resistance of about 110 ohms. The very low resistance of the connecting wiring may be entirely disregarded. With the resistances given, the normal strength of current flow through the reactance coil, transmitter and primary in a 24-volt office, according to Ohm's law, will be equal to 24 volts divided by 240 ohms, or 0.1 ampere.

Since the resistance of the transmitter has been assumed to be 120 ohms, the *drop in potential* around the transmitter and the primary winding of the induction coil (10 ohms) is equal to 0.1 ampere times (120 plus 10), or 13 volts. Since there is a difference of potential of 13 volts around the transmitter and primary, the condenser, *X*, will be subjected to this as a charging voltage. That is to say, the charge of the condenser, *X*, under normal conditions, is the one produced in it by an an electromotive force of 13 volts.

456. *Relation of transmitter resistance to charging voltage of condenser.*—As the transmitter diaphragm is thrown into vibration by the sound waves striking it, the transmitter resistance varies, becoming higher at times and at other times lower. Suppose, for the moment, that the resistance of the transmitter is momentarily increased to 130 ohms. The effect of such an increase in resistance is not exactly the same in this arrangement as it is in the simpler arrangement shown in Fig. 158.

In Fig. 158 such an increase in the transmitter resistance would be followed at once by a corresponding reduction in the strength of the current flowing through it from the battery. In Fig. 159 the current flow to the transmitter from the battery must pass through the winding of the reactance coil, *M*, but its design is such as to prevent *sudden* changes in the current passing through its winding. Therefore the transmitter changes, which are of high frequency, cannot affect the strength of the current flow through the winding of the reactance coil. They do affect the condition of charge of the condenser, *X*, however, by causing a variation in the electromotive force impressed upon its terminals.

When the transmitter resistance is increased to 130 ohms, the drop around the transmitter and primary, assuming that the effect of the reactance coil is to maintain the uniform strength of the current flow, is equal to 0.1 ampere times 140 ohms or 14 volts. But the condenser, *X*, under normal conditions has been assumed to be charged under a difference of potential of only 13 volts. As the transmitter resistance increases to 130 ohms, therefore, the voltage impressed upon the condenser terminals is increased to 14 and its charge is correspondingly *increased*. In other words, the excess current barred from passing the transmitter is forced into the condenser in the form of an addition to the existing charge.

When the transmitter resistance is decreased to 110 ohms, on the other hand, the drop around the primary and transmitter is decreased likewise to 0.1 ampere times 120 ohms, or 12 volts. The condenser, already charged, normally, to a difference of potential of 13 volts, is subjected to the lower charging voltage and partially *discharges* itself into the primary and transmitter. This is the exact reverse of the effect of increased transmitter resistance and the condenser now supplies the additional current flow through the primary required by the condition of the transmitter.

It is useful to consider the condenser in this arrangement as a reservoir, continually replenished by current through the reactance coil, which absorbs excess current and supplies additional current as the transmitter conditions call for it.

457. *The secondary condenser.*—In Fig. 159 a condenser is shown in series with the receiver and the secondary of the induction coil. This condenser is necessary in order that no flow of direct current may occur through the winding of the receiver and the secondary when the operator's set is used in connection with common battery cord circuits. Were this condenser not provided, the current would pass from one strand of the cord through the operator's set to the other strand. With the condenser installed as shown, the current from the battery is barred but very little opposition is offered to the passage of the alternating voice-carrying currents through the receiver and secondary.

(To be Continued.)

New Publication Dealing With Inductance.

The United States Bureau of Standards has just issued Scientific Paper No. 281 entitled, "A Study of the Inductance of Four-Terminal Resistance Standards."

This paper deals with the inductance of electrical resistances of less than one ohm. New methods of measuring alternating current require small resistances in the laboratory tests. Even very small errors in a standard would introduce serious errors in resulting measurements. This represents an important and practical contribution to precision measurements. Those interested in the subject may obtain a copy free by addressing a request to the United States Bureau of Standards, Washington, D. C.

Problems We Must Meet in the Telephone Business

Attitude of Telephone Companies Toward the Public—Campaigns for the Education of Patrons in Details of Telephonic Communication, Advocated—Accounting, Finance and Service Problems—Paper Presented at Convention of Illinois Independent Telephone Association

By O. F. Berry

The invention, development and use of the telephone is the miracle of the last quarter of a century. Its present place in the social and business world is a marvel of civilization. Its future use and permanency is a growing problem. The very rapid progress that is being made in every department of business has already led and is leading to many grave difficulties.

The words, "stop, look and listen" are very appropriate in many lines of trade, and we as a class interested in the telephone business, may well take this signal and obey it. But that is not sufficient and if I may change the wording to suit our particular business at this particular time and in the near future, I would say, "stop, think, act."

The need of our business today is not more rapid development, but a more careful study and greater efficiency. I do not expect at this time to present any new theories or new plans for carrying on the telephone business. The interests are of such magnitude that every one of us should give greater heed than we are doing, to what might be termed the common needs or problems that confront us. And briefly I want to call your attention to a few things that I believe are worth remembering.

Competition or Regulation.

The first one I call attention to is: Shall we have competition or regulation? The theory upon which the telephone came into use and was operated for a long time, was that competition is the life of business. This sentiment was inherited from other classes of business entirely different from the telephone business. This statement may be true of any class of business where the community in which it operates can get the use, or get the benefit of the public enterprise, from one institution or organization sufficient for its needs.

But the peculiar condition of the telephone business is that every person in every community wants every person in that and every other community. Therefore, competition is not advantageous and never has been. While we cannot now and may never be able to do away with it entirely, it should be done, so far as it is possible to do so without injuring the individual, the company or the community. There is much less need of competition since we have commissions for our regulation.

It is indeed a complex problem when we consider the relations between companies doing similar business in the several communities in this or other states, as to what will be or should be the final result. In the past I am sure that these relations have not been what they should have been. Unpleasant or strained relations between business enterprises, as a rule, lead to more or less friction or ill feeling, which is always detrimental to the individual, the business and the community. I am glad to be able to say that companies, so far as I know at this time, do not deem it necessary to employ methods that are next to real warfare and destruction, as heretofore.

Duty of Commission With Regard to Fixing Rates.

Commission regulation is a step in the right direction. The commission is not a true servant of the public unless it unhesitatingly gives special attention to all public utilities, and either raises or lowers incomes and rates, such as a careful examination justifies. It is their duty to encourage all legitimate enterprises for the public use and see that the investor in such enterprises shall get a fair return on the money he invests, and all regulation, either by commission or otherwise, should be conditioned upon keeping in view this fundamental fact.

The public can only be well served and labor properly paid, when public enterprises or utilities receive a fair return upon their investment. Burdens should not be placed upon public enterprises or utilities beyond what they are reasonably able to bear. It is only just and fair, and I am glad to say that our state commission has pursued this course, and utilities that have presented their needs fairly and openly to the commission have received, so far as I have been able to ascertain, proper assistance, protection and encouragement, all of which has resulted in increasing materially the stability and permanence of the telephone business in this state.

I am therefore of the opinion that regulation is far more valuable, both to the people at large and all telephone companies, than competition, and that is surely true if the competition is of such a character as to materially injure, by way of income or service, either of the plants so competing. Let the policy of our association be to encourage proper regulation.

The Problem of Rates.

The next problem is rates, and I speak of the city exchange, rural lines and switching service, as one. Comparatively few telephone companies are receiving sufficient compensation for this service. Many are getting fair rates in the city exchange. Many more are receiving less than they should receive from their rural lines, and few companies receive a sufficient amount for switching service. I mean by switching service, doing the physical work necessary and also giving a certain amount of territory and service as a part of the switching rate.

This is not always the fault of the community in which the company is operating. Many companies are operating today that do not know whether or not they are receiving a sufficient price for their service, for the reason that they have never kept a close account of all of the details entering into the business. In other places there has been such a feeling created in some way, that the community practically denies the telephone company what it is entitled to receive.

The difference of opinion between the people of a community and a public utility, and especially a telephone company, lies, in my judgment, largely in the failure of the public to understand all of the cost factors entering into the construction and operation of the plant; also a failure to know all of the expense which necessarily must be incurred in operating the property, keeping the service at a high grade and preparing for a fund to rebuild in the future.

The want of this knowledge is not the fault of the public, but practically the fault of the public utility doing business in that community. I will elaborate more at length upon this phase of the subject in discussing another problem later on. Let it be remembered that the matter of rates and return to the company from the public for service, necessarily, is the foundation of all permanent telephone business, and the utility and the community that desires the service should co-operate to that end.

Telephone Accounting.

One of the new things that the state utilities commission brought to us, is accounting. Prior to its organization, and the prescribing of rules and regulations relative to the opera-

tion of telephone properties, little attention was given by many telephone companies to accounting and comparatively few of the smaller companies knew whether they were making or losing money. Many of them did not know the cost of labor and material entering into their respective plants, and were collecting all the money they could, borrowing in many instances and investing it in the extension of the plant without pausing to make even an inquiry as to what the final result would be.

At present, however, no other subject is receiving more serious attention, not only by the individual companies but by service associations, and we have a great deal to thank the commission for along this line. The rural telephone company will never prosper so long as it confines its bookkeeping to a list of the subscribers' names, and its contracts for service and switching to an oral statement made by the respective parties, which neither of them ever understood very well, resulting always in a difference between the parties at the time of collections.

Nothing will do even a small company more good than to get a set of books and keep them carefully and accurately so that the owner of the plant may know the cost of the service being rendered and balance it against the amount of money being received. He can thus determine the value of his property and whether or not he is receiving a fair return upon his investment. These are mere suggestions, but I want to urge the importance of more careful bookkeeping in the future than we have done in the past.

This association can render no better service to telephone interests than to arrange for a committee whose duty shall be to confer with accountants and with the experts of the state public utilities commission with a view of providing for more simple reports, requiring the smaller companies to furnish only such data is material for such companies' use. Many of the reports at the present time require data which is difficult and expensive to procure, and is of no practical assistance or value to the smaller companies.

The question of requiring annual reports to cover the same period of time should also be taken up with the Interstate and state commissions.

Educating the Public.

A very important problem is that of education of the public. The telephone business is a new business. It has grown very rapidly, and there has not been given to the matter of its detailed operation, the attention due. The public, generally speaking, knows but very little about the details of a telephone exchange business.

It is my opinion, based upon a reasonably careful study of the question, that the telephone business which we have created and brought up to its present state of efficiency, will in the future either succeed or fail just in proportion to the manner and character of the education given to the public. We must, if we expect to succeed with this great enterprise—which it is now conceded is not only a luxury but a necessity—educate, satisfy and please the public. It is impossible to please the public in a service of this kind without first educating them in relation to it.

In many ways the business is so separated from the ordinary daily experience of the individual, that what otherwise would be considered entirely satisfactory, in the telephone service is considered wholly unsatisfactory. This results almost entirely from a want of knowledge of the manner of operating and the difficulties under which both the company and the operator labor. If the subscriber were fully informed along those lines, the difficulty would be removed and the subscriber pleased.

I hear some one ask: How shall we educate? This question is more easily asked than answered. It can be answered in a measure, however. When the sleet storm comes in a community and the subscribers can see that the wires are broken, it is easily understood why service cannot be rendered. The public knows all about it and there is but little, if any, criticism on account of the failure of service. But under normal conditions where a small wire unseen is broken, or a cable somewhere springs a leak, or some person has in case of storm cut the wire and tied it together or has forgotten to tie it together after the storm, or if by chance, as sometimes happens, the operator neglects her duty and the service is thus affected, the subscriber thinks he has a grievance and complains bitterly, simply because he does not know that the company has done and is doing every thing it can to remedy the condition and to render the service.

We should not only educate the community in relation to service but also along other lines, such as construction, repairs, materials, etc., the reasons for building in a particular way, for wiring a house in a particular manner. The reason why certain combinations of telephones will not render good service and others will, should be fully and carefully explained to the public.

Sometimes companies forget that they are public enterprises and are inclined to deal with the community in the same manner as they do with their other private business. This should never be, as it always results in injury to the company.

The chief operator of our company, last year, gave a series of public demonstrations in the exchange, inviting the women subscribers to attend 10 or 20 at a time, giving 30 minutes to each demonstration. They placed telephones in the exchange, sent messages, both local and long distance, the latter as far as Chicago. Thus every subscriber present saw how many persons and exchanges are actively concerned in putting through a message, and the difficulties under which the local operators labor. I am informed by the chief operator that from that day to this, practically all the women who called and examined carefully the equipment and heard what was said and the explanations made in relation thereto, have been strong friends of the operator and exchange, and scarcely a complaint has come to her unless one justly made.

Strange as it may seem, it is seldom that we see in the ordinarly newspaper articles relative to the telephone company or telephone service. The newspapers in every community could render invaluable service to the company and to the community, by publishing articles explanatory of the business, inviting papers from local operators and especially chief operators and publishing the same. Nothing will bring to the company better returns nor to the community greater satisfaction, than a free and full discussion of the manner and character of telephone service. Let us take the public into our confidence, be patient and explain to them fully. Then render the very best service possible and practically all of the troubles of the telephone business will vanish.

Character of Service.

Following this education the next problem is the character of service. While we should educate the public it is equally essential, if not more so, that we educate the operator, the local manager, the lineman and the collectors. Most of these employes grow into the business and are not educated into it. In many of the smaller exchanges, operators are placed at a switchboard of which they have no knowledge either of its make or manner of operation. They have no knowledge of the lines, how they are connected, what effect the electric current has upon the keyboard or upon the line or upon the telephone.

We could not and would not put such an inexperienced person in any of our other offices, or put them in charge of any of our business without instruction and education. You require your stenographer, before giving her dictation and putting her in charge, in a measure, of your business, to educate and equip herself for that particular business. This frequently takes months to learn, even the shorthand part of it, while we place another girl at the telephone switchboard, which is in many respects more difficult and more important to the public, without any schooling or instruction whatever.

In the last few years we have had schools of instruction for operators, such as we are holding here at this convention,

but they are of a late date and not patronized to the extent they should be. Your local manager should be instructed as to his duties and especially should have information that he can give intelligently to your subscribers.

This is equally true of the collectors. They should know how to meet people and should be thoroughly familiar with the accounts of the company so that the questions raised could be intelligently answered.

To carry forward this education and instruction among all of the employes of the company is a large undertaking, but it should not discourage us. It should be begun and carried on continuously, for in it will be found the solution of many problems. The idea of service should be constantly kept in the minds of every employe. We are inclined to confine the matter of service to the operators, when, on the contrary, it should be extended far beyond the operator at the board.

I hear some one say there is a continuous opposition and complaint against the service in our community. Possibly it is well founded. The legitimate and only method of meeting opposition is by giving superior service. Much more is required of telephone companies today in the way of service, than has ever been before, and properly so. The public is more difficult to satisfy. Therefore we need better equipment, better construction and more intelligent operating. The telephone was originally considered a toy or plaything. Today it is the most used instrument in the world. This shows the responsibility of operating companies to the public.

Finance.

Last, but not least, among the problems suggested, is finance. The best method to be adopted in securing money to be used in the establishment of telephone exchanges, the building of permanent homes for telephone companies and improving them with modern equipment, is as yet undetermined. In the telephone business the problem of finance is a continuous one. In many other lines of business the investment is made once and no immediate additions are required. In the telephone business, however, in the past as well as in the future, the construction account is never closed. As yet the demand is for the constant improving and extending of the system. This requires additional money continuously.

The stability of telephone securities was greatly injured in the early history of the business; first, because of the many cheap and unsatisfactory small exchanges that were built throughout the country. Then later by the promoter, who went into communities and led the people to believe that great fortunes could be easily made by organizing telephone companies, oftentimes in competition with operating companies. And without sufficient knowledge the community accepted his statements, organized companies and issued stock or bonds far beyond the amount necessary to build an exchange, then proceeding to fix the rate far below what the operating could be done for.

In a few years their plant began to depreciate and they found their income entirely too small. They undertook to raise the rate. The other struggling company in the community refused to raise. As a result, both of them failed; the community was dissatisfied with the business, and the credit and securities of the companies were discounted.

This condition, in a large measure, has been removed, but Independent telephone interests have never presented, either locally or at large, the value of telephone securities. They have never encouraged the purchasing of stock or bonds locally, outside of the few persons directly interested in the enterprise, and for that reason, and many others, it has been hard to finance telephone plants. Heretofore, also, there was no regulation as to how much stock or bonds should be issued. It was left to local communities, in a large measure, to fix the rates companies should receive for service, which in many cases were wholly insufficient to maintain the plant, pay the interest and other financial obligations.

The coming of the commission and the act of the legislature creating it, have done away with this obstacle, so that neither bonds nor stock can be issued by a telephone company, without a proper presentation of its physical property, income and rates to the commission for approval. It is not only the duty of the commission under our law, to authorize the issuing of a sufficient amount of stock or bonds to properly maintain a plant, but it is also its duty to see that only such an amount of stock or bonds is issued by the company as is justified by the value of the plant. And it is further the commission's duty to see that such rates are charged by such company as will maintain the plant properly, take care of the interest on all the company's obligations, pay a dividend on the bonds and prepare for the final payment of bonds if such are issued. That this supervision has materially added, and properly so, to the value of telephone securities is evidenced by many things that have recently occurred.

Last year a London firm wrote to California asking to be given a list of all of the utility bonds or stock for sale, as authorized by the California commission. Later it arranged for the purchase of a large amount.

In the January number of The World's Work, an article appeared dealing with the subject of utility securities. The article states that an investor made inquiry as to the value and return and stability of utility bonds, from which article I quote as follows:

> The explanation for this assuring record of market stability has to be sought, of course, in the record of property value as measured by earning capacity. This record is still incomplete for 1915. But the record for 1914, which was a year of exceptionally unfavorable business conditions throughout the country, makes out a strong case for the utilities.
>
> There is a rapidly growing demand among discriminating investors for the securities of those utility companies whose financial and operating policies have contributed the most substantially to this generally favorable record. Indeed, they are the securities that make up, perhaps, the most important market to which the average investor can turn to get 5 per cent. or more interest with safety and a reasonable degree of marketability.

It is manifest from the foregoing quotation and similar articles that are appearing in public print at this time, that utility bonds under the supervision of commissions are going to increase in value and will be much desired by the investor at no distant day. No better security, in my judgment, can be found than either stock or bonds issued upon a proper and honest showing of the physical property and income of a telephone company to a commission, and after investigation by it, authorized by said commission, for the following reasons:

First, the right of any holder of stock or bonds to present to said commission any misconduct or failure to maintain the plant by said utility, and the authority and power of the commission to protect said bondholder or stockholder by requiring said utility to maintain its plant in proper condition, even to the extent of requiring it to raise its rates sufficiently to meet the proper returns upon the investment and take care of its securities. Second, the income for telephone rental and service is received frequently in small amounts from every class of people. Third, the service is considered to be a necessity and, therefore, business depression does not affect the income of the telephone company as it does many other business enterprises. Fourth, statistics show that in the last panic, while the incomes of railroads decreased a large per cent., telephone companies were but little affected. Fifth, as a rule, telephone companies are owned and managed by the business men of a community who not only have the company's interests but their own character and business integrity to maintain, by keeping up the plant and meeting its obligations.

There are other reasons that might be named, and these reasons and such others should be published much more than they are. Telephone men should talk their business, its stabil-

ity and its increase and thus assist in establishing the credit and demand for such securities. With a national association representing the telephone interests at large, and with a state association such as ours, representing them more in detail locally; with the number of men and the amount of money invested in this enterprise, can any one doubt that, if properly conducted, it is a staple and profitable business?

Behind all enterprises that succeed, whether partnership, association or corporation, is the character of the men engaged in that business, and it is their business to perform the service necessary. Let us by honest endeavor upon our part, place the telephone business side by side with banking and railroading, where it properly belongs.

We are engaged in a most difficult and, at the same time, a most interesting business, for the reason that we are performing the highest type of public service, and there is always satisfaction in rendering either public or private service well. Many of you men before me today have had a large share in the business and the fundamental principles that underlie the problems I have presented. They are old problems but must be operated in a new way—with greater care than formerly.

The Independent telephone business as well as the telephone business at large is far more successful and in a better condition today than ever before. In this success many of you are entitled to a large share. Let us do our duty in such a way that in solving these problems we will bring great good to the business in which we are engaged and to the community and the public which we serve.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies, Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Company May Restrict Use of Subscriber's Telephone.

In an opinion written by Chief Justice D. N. Straup, and concurred in by Justices J. E. Frick and W. M. McCarty, the Utah Supreme Court has denied the petition for a writ of mandamus asked by H. W. Johnson, proprietor of the Metropole bar, Salt Lake City, to compel the Mountain States Telephone & Telegraph Co. to re-connect a telephone in the petitioner's place of business.

The opinion sets forth a ruling on the question of use of private telephones that must have a bearing upon the controversy that has risen between the telephone company and various patrons who have insisted upon the right to allow customers free use of office telephones.

The concluding paragraph of the opinion contains the following comment:

> Certainly the plaintiff may not contract for a restricted use of a telephone, and then claim the right to permit any and all persons, without restriction or hindrance whatsoever, to use it as he may designate.

Mr. Johnson's telephone was removed by the company last fall, after he had refused to prevent customers from using it, although a public pay station telephone was in his saloon for convenience of the general public. The allegation was made that Mr. Johnson admitted "permitting and encouraging persons other than mentioned in the rule" to use the private telephone.

The opinion calls attention to the contract between the company and the telephone subscriber, and gives it as the basis for the decision against Johnson and in favor of the company. In the opinion the following quotation from the contract is cited as sufficient reason for denial of the petition:

"The subscriber agrees that the instrument shall be used only for the purpose of personal communication of the subscriber and his employes or immediate household, upon the subscriber's business."

Orders Connection With Virginia Farmers Company.

The Virginia State Corporation Commission, in an opinion handed down by Chairman Robert R. Prentis last week, ordered the Chesapeake & Potomac Telephone Co. of Virginia and the Augusta County Farmers Mutual Telephone Co. forthwith to connect their exchanges at Stanton, Va., with each other for the interchange of messages between their subscribers, provided the petitioner for connection, the Augusta County Farmers Mutual Telephone Co., indicates its desire to do so upon terms fixed by the commission.

These terms are that "the Augusta County Farmers Mutual Telephone Co. shall pay to the Chesapeake & Potomac Telephone Co. of Virginia, the sum of $3 per annum for each and every one of the telephones on its lines thus connected, payable in advance in semi-annual installments. The line between the switchboard of the Augusta County Farmers Mutual Telephone Co. and the corporate limits of the city of Staunton shall be maintained in good order by the Augusta County Farmers Mutual Telephone Co., and the line from the corporate limits of the city of Staunton to its switchboard by the Chesapeake & Potomac Telephone Co. of Virginia."

Commissioner J. Richard Wingfield, in a dissenting opinion, assented to the commission's judgment on the principle of public welfare involved, but thought that the charge of $3 a year for each telephone was too steep.

"This sum," he says, "is, in my judgment, excessive. There should be reciprocity between the two exchanges, and a fair division of the costs of the joint service should be apportioned according to the revenue collected from subscribers, respectively, by the two companies."

Relations between the county company, which was organized during the latter part of last year, and the Chesapeake & Potomac Telephone Co. of Virginia, operating in the city of Staunton, were severed early this year, leaving the subscribers of the county company no connection with the city telephones or with the private lines in Augusta county. For many years farmers in the county built their own lines, installed their own telephones and had them connected with the city lines at the corporate limits of Staunton.

Dissatisfied with the service obtained in this way, they organized last year the Augusta County Farmers Mutual Telephone Co. and established their switchboard just outside of Staunton. Thirteen other private lines, which formerly were connected with the city switchboard, paying $3 a year for the service, soon were connected with the switchboard of the new concern.

The city company objected and severed relations. Whereupon, the county company brought its troubles before the Virginia State Corporation Commission, suing for an enforced physical connection between the two boards.

Tentative Accounting Rules of Florida Commission.

A set of accounting rules prescribing systems of accounts to be kept by Classes A, B, C, and D telephone companies has been tentatively drawn up by the Florida Railroad Commission. The proposed accounting rules incorporate the Interstate Commerce Commission's classification of accounts for class A, B, and C companies, in addition to the segregation of toll and exchange operations and Florida

business only. On account of the Interstate Commerce Commission not having prescribed a system of accounts for class D companies, the Florida Railroad Commission has found it necessary to prepare a proposed form of accounts to be kept by the small companies of this character. The proposed form is said to be very simple and, if adopted, will afford an easy and accurate record of their financial operations.

Rulings of Florida Commission During 1915.

The rulings of the Florida Railroad Commission affecting the operation of telephone companies, handed down during the year ended February 29, 1916, are summarized in the annual report of the railroad commission, as follows:

No telephone company shall give free or reduced rate service to any person except those allowed by law.

Cash deposits shall not be required of prospective subscribers as a condition precedent to the establishment of telephone service. Three months' rental in advance shall be collected from all prospective subscribers alike on new installations, and thereafter only one month in advance shall be collected before the eleventh day of the month.

Telephone companies shall furnish telephone service to all persons applying therefor within the exchange area limits without any installation or connection charge.

The exchange area of all telephone companies shall be the city, town or village area within the city, town or village limits.

Additional listings in the directory shall not be more than $3 per year.

Additional lines in the directory shall not be more than $3 per year.

Additional charges for desk telephones shall not be more than $3 per year.

Reduced rates to stockholders of a company are prohibited.

All toll charges to subscribers and non-subscribers to the local exchange service shall be the same.

Two or more persons, firms or corporations may use the same telephone by paying a joint-user rate therefor.

Telephones in university and school building are classified as business stations.

No toll station or local exchange shall be abandoned without first receiving the approval of the commission.

No local, toll or special rate shall be established or changed until approved by the commission.

Washington Commission Indorses Territorial Division.

In a Whatcom county ruling last week, the Washington Public Service Commission not only expressly indorsed, but officially required division of territory agreements between telephone companies which otherwise would be competitive. In passing on the case the commission announced this policy.

"We are of the opinion that the highest efficiency and greatest economy in telephone communication, which must have a strong influence upon rates, can only be had by allowing no duplication of agencies, and that a proper division of territory between telephone companies is, upon the whole, beneficial to patrons and will result in the highest development of telephone service in this state."

Illinois Farmers Want Toll Taken Off.

J. F. Scholl, Alex. Anderson, F. W. Scholl, L. F. Scholl, H. A. Parks, J. L. White, William Straw, and Lee LeFevre, have filed an application with the Illinois State Public Utility Commission for the abrogation of the toll charges of the Polo Mutual Telephone Co., and the Dixie Home Telephone Co., between their Polo and Dixon telephone exchanges. The application is made upon behalf of all the subscribers of both the Polo and the Dixon companies.

It is claimed that the toll charge of five cents for each telephone message collected from the rural subscribers of each of the companies is an unjust, unfair, inequitable, and discriminatory charge and in equity and good conscience ought to be abrogated. It is asked, if the commission find the charge to be inequitable to give free toll to all subscribers of both exchanges, that at least free toll be given to the rural subscribers of both exchanges.

Injunction in Chicago Automatic Sale, Denied.

Federal Judge Landis of Chicago this week overruled the petition filed by Attorney Fayette S. Munro for Otto Cullman, 5400 Wayne avenue, Chicago, asking that the Chicago Telephone Co. be restrained from paying $2,532,000 for the automatic telephone system of the Chicago Tunnel Co.

Mr. Cullman, a stockholder in the Chicago Telephone Co., filed a bill the latter part of June, as reported in TELEPHONY of July 1, alleging that if the sale were allowed it would but complete a step in the plans of the American Telephone & Telegraph Co. to secure a monopoly of the telephone business of the country.

Judge Landis denied the petition on the grounds, made in the telephone company's answer to the petition, that the United States Supreme Court had ruled against action of the kind by any stockholder who had purchased his stock after the transaction alleged in the bill had taken place. Mr. Cullman is such stockholder.

Fails to File Acceptance of Commission's Stipulations.

The Tri-State Telephone Co. of Chadron, Neb., has failed to accept the terms of the Nebraska Railway State Commission to be allowed to issue $108,000 in stock and $75,000 in bonds.

In the hearing on the proposed issue, the commission made a deep cut in the requests of the new corporation, and laid down vigorous requirements as to the disposition of the funds, with the stipulation that the terms of the commission be accepted within ten days. The ten days have expired and nothing has been heard from the company.

If the company pursues the plan to make the proposed stock and bond issue, it must appeal for an extension of time or make a new showing before the commission.

Want Heavy Damages From Cumberland Company.

D. L. Jackson and J. T. Redding, of Coldwater, Miss., have entered suit against the Cumberland Telephone & Telegraph Co. for $20,000 and $5,000, respectively, as a result of an automobile wreck on the Hernando road about two months ago. The little son of Mr. Jackson was killed and Mr. Redding was painfully injured when the car in which they were riding struck a telephone pole in the edge of the road.

This particular pole is out of line, being four and a half feet nearer the center of the road than those on either side of it, and is the chief fact on which they base their claims.

May Institute Occupation Tax in Fort Worth.

That the city of Fort Worth, Texas, contemplates the assessment of a city occupation tax on telephone and electric light poles and wires, similar to the Dallas, Texas, tax which is now being fought by the Southwestern Telegraph & Telephone Co. in the Supreme Court of the United States, is evidenced by the visit of City Tax Attorney Pope, of Fort Worth, to Dallas on July 26. Mr. Pope was in Dallas for the purpose of gathering data on the Dallas pole and wire tax ordinance, in order to consider the advisability of instituting such a tax in his city.

The Dallas ordinance has caused considerable litigation between that city and the Southwestern company, and after being taken through all the courts of Texas, including the supreme court of that state, is now before the high federal court on a writ of error. The intention of the ordinance is to levy an occupation tax on corporations that do not pay a gross receipts tax to the city.

Merger Proposed at Lawrence, Kan.

A merger of the Bell and Independent plants in Lawrence, Kan., has been proposed by W. E. Hemphill, of Kansas City, who recently consolidated the telephone systems in Ottawa, Kan., under the name of the Kansas Telephone Co. No action has as yet been taken in the matter by the city commission, before which the latter proposition was placed.

Merger Proposed in Gainesville, Texas.

The Peoples Home Telephone Co. is planning to consolidate its local exchange in Gainesville, Texas, with the local exchange of the Southwestern Telegraph & Telephone Co. in that city, a merger ordinance having been passed by the city council on July 4. After the consolidation has been effected, a charge of $2 per month will be made for residence telephones and $3.50 per month for business telephones. A maximum business rate of $4 per month is provided for.

Companies in Denton, Texas, to Consolidate.

At a special meeting last week, the city council of Denton, Texas, passed an ordinance permitting the consolidation of local exchange of the People's Home Telephone Co. and the Southwestern Telegraph & Telephone Co. The rates to be charged after the merger is effected will be $3.50 for business telephones and $2 for residence telephones.

Wisconsin Suit Settled by Compromise.

The suit of the state of Wisconsin against the Door County Telephone Co., of Sturgeon Bay, Wis., for a penalty of $150,000 for neglect to comply with an order of the state railway commission requiring the company to improve its service, has been compromised by the payment of the minimum penalty of $700 by the company to the state.

Gross Earning Tax Paid to City of Ft. Worth, Texas.

The Southwestern Telegraph & Telephone Co. has paid the state of Texas $25,723 as its 1½ per cent. tax on its gross revenue for the quarter ending June 30, 1916. The gross revenue amounted to $1,714,873.

Summary of State Commission Hearings and Rulings.

CALIFORNIA.

July: The Nevada-California-Oregon Telephone & Telegraph Co. authorized to issue $15,000 face value 6 per cent. bonds at not less than 80 per cent.

ILLINOIS.

August 3: Order issued approving the purchase by the Stephenson County Telephone Co., of Freeport, of the property of the Freeport Telephone Co.

August 3: Order issued authorizing the Stephenson County Telephone Co. to substitute short-time notes to the amount of $32,500 in lieu of the same amount of preferred stock and 6 per cent. mortgage loan as asked for in its original petition.

August 3: Petition filed with commission by J. F. Scholl, Alex. Anderson, F. W. Scholl, L. F. Scholl, H. A. Parks, J. L. White, W. Straw and L. LeFevre on behalf of themselves and all subscribers of the Polo and Dixon companies, for abrogation of the toll charges of the Polo Mutual Telephone Co. and the Dixon Home Telephone Co. between their Polo and Dixon exchanges.

KANSAS.

September 12: Postponed hearing on application of the Missouri & Kansas Telephone Co. for permission to increase its rates at Wellington, Kan.

MISSOURI.

September 18: Hearing in the matter of adopting a uniform system of accounts for telephone companies. Every telephone company in the state has been given notice that it will be expected to be present or to be represented, and to introduce any evidence necessary to assist in the promulgating of a uniform system of accounts for telephone companies. Case 937.

September 18: General conference in which representatives of all telephone companies in the state are to meet with the commission and to introduce all testimony and evidence required in the adoption of uniform rules, regulations and practices.

NEBRASKA.

July: Application filed by the Farmers & Merchants Telephone Co., of Alma, to have validated certain rules of operation, which, it is claimed, have been in force on the exchange for 15 years viz.: To close at 11 p. m. and to open at 5 a. m.; to close on certain holidays at 10 a. m. and open at 3 p. m., to make a charge of 10 cents for all calls answered during the closed hours and a charge of 15 cents where the calls must go through two exchanges.

July 31: Platte Valley Telephone Co., of Scottsbluff authorized to issue and sell $50,000 worth of stock, in a supplemental order issued by the Nebraska commission. This order allows the issue of $25,000 more than was allowed in an order in May, following a report from engineers that $54,300 as the estimated requirements in reconstruction and new lines to meet conditions arising from the increased development of that locality. In granting the request it is specified that the company must make a full report of expenditures in connection with the deal to the commission.

August 11: Hearing on application of the Kearney Telephone Co. for permission to increase its rates conditional upon the plan for the consolidation of the Bell and Independent exchanges in Kearney, Neb., being carried through.

NORTH DAKOTA.

July 31: The plant of the Northern Telephone Co. at Tagus ordered appraised and its purchase authorized at the appraised value by the Rolling Prairie Telephone Co., a farmers' line which built into the town after the Northern company had established an exchange, and took away most of the business. The Northern company alleged that this act was contrary to the state law.

OHIO.

August 9: Continued hearing at Columbus, Ohio, relative to the proposed merger of the Bell and National telephone companies in Bellaire, Ohio.

VIRGINIA.

August 2: Chesapeake & Potomac Telephone Co. of Virginia and the Augusta County Farmers Mutual Telephone Co. ordered to connect their exchanges at Stanton with each other for the interchange of messages between their subscribers, provided the petitioner, the Augusta county company, indicates its desire to do so upon terms fixed by the commission. Commissioner J. Richard Wingfield in a dissenting opinion, assented to the commission's judgment on the principle of public welfare involved but thought the rate ($3) for each telephone connected too high.

WASHINGTON.

August 1: Commission in a Whatcom county case not only endorsed but officially requires division of territory agreements between companies that otherwise would be competitive.

WEST VIRGINIA.

August 2: Petition filed by the four telephone companies operating in West Virginia as the Bell system, to consolidate and operate as the Chesapeake & Potomac Telephone Co. of West Virginia. Permission was also asked to change rates and service necessary in the consolidation. The petition shows that the companies have 45,000 stations in the state.

September 12: Hearing on the application of the four Bell telephone companies of West Virginia for a proposed consolidation. The companies include the Consolidated of West Virginia, with offices in Wheeling; the Chesapeake & Potomac Telephone Co. of West Virginia, the Central District Telephone Co. and the Chesapeake & Potomac Telephone Co. of New York. These companies have 45,000 Bell stations in West Virginia. The proposed name for the merged companies is The Chesapeake & Potomac Telephone Co. of West Virginia. Protests against the merger may be filed by any subscriber or citizens of the state.

WISCONSIN.

August 3: The Wisconsin Railroad Commission dismissed the petition of the Bangor Telephone Co., of Bangor, for an order requiring the Chicago, Milwaukee & St. Paul Railroad to change its high tension signal system at Bangor so as not to interfere with the telephone service.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25, 1915—Part III, Telephone Accounting and Auditing, by James H. Shoemaker, Completed January 15, 1916—Part IV, Telephone Finance, by J. C. Kelsey and S. R. Edwards, Completed June 3, 1916—Installments Now Being Presented Comprise Part V, Telephone Advertising and Publicity, Written by Roy D. Mock

Quiz Questions on the Preceding Installment.

39. State a form of newspaper advertising which can be made profitable. What is its advantage?

40. What advantage or disadvantage is there in the numbering of advertisements?

41. State some objections to the use of the abbreviation "phone" for "telephone."

42. Why should the Independent Shield be featured on advertising matter?

43. What relation does psychology bear to advertising?

44. Why is a knowledge of the fundamental principles underlying the science of advertising essential to those interested in the results attained from advertising?

45. What is given as a psychological principle for the securing of attention?

CHAPTER V. Practical Advertising Psychology (Continued).

46. *Power of an Advertisement to Obtain Attention.*—Another advertising fact that has been scientifically demonstrated may be stated as: The power of any advertisement to force itself into attention depends upon the absence of counter attraction.

This fact seems almost self-evident. To prove this point, take up a magazine or newspaper and hunt through it until a page of very small advertisements is found. Then observe what a slight chance of being seen each of these advertisements has. If there are twenty advertisements on the page, each advertisement has only about one-twentieth the chance of being seen that it would have if it occupied the entire page. Fig. 37 furnishes an illustration of this point. Observe how the advertisement in the upper right hand corner, predominates.

In this connection it should be borne in mind that by size is meant rather the proportion of the page occupied than the actual area of the space used. One-fourth of a page in a newspaper may be larger in area than a full page in a magazine. It will not have the same attention value, however, on account of the various other advertisements on the same page, with which it competes for attention.

47. *Attention Value of an Advertisement and Space Occupied.*—Attention value, of course, does not depend entirely upon the size of the space occupied. As pointed out in previous installments, by careful attention to layout one advertisement can be made to possess greater attention-attracting force than another occupying the same size space. But there is no ignoring the fact that an advertisement occupying one-fourth of a page has a better chance of being seen than one occupying one-sixteenth of a page.

For the benefit of those with a technical turn of mind, it might be stated that the difference in pulling power of two advertisements does not vary directly with the proportion of the page used, but rather as the square roots of the fractions of a page. For instance, a quarter-page advertisement is not four

Morgan Park Preparatory Schools
(Formerly Morgan Park Academy)
Military. Strictly academic. 14 miles from Chicago. Boys educated through books and "observation" tours to Chicago's industrial institutions. Address H. D. ABELLA, Principal, Box 306, Morgan Park, Ill.
LEWIS INSTITUTE
An Endowed Polytechnic School for Both Sexes.
Accredited. College Work in Mechanical and Electrical Engineering, and in Mechanics, Household and Liberal Arts, leading to degrees of B. S. High School Instruction in Science, Literature and Technology. Well equipped shops and laboratories. Dormitories for Girls under Institute Management. Day and Evening Sessions. Day School opens Sept. 21. Evening School opens Oct. 9. For Bulletin Address
Lewis Institute, Dept. 10, Madison & Robey, Chicago
STAMMER NO MORE
Come to me for quick, permanent cure. Individual instruction a specialty. Investigate.
The Hatfield Institute for Stammerers,
189 North Dearborn St., Chicago, Ill.
Columbia Business College
Largest school on Northwest Side. We teach Munson, Gregg, and shorthand on the typewriter. Complete courses in Business, Dictaphone and Comptometer. Call, write or phone Humboldt 2590.
TRAINING SCHOOL FOR NURSES—The Michael Reese Hospital. Registered by the State of Illinois. 3-year course preparatory instruction. Theoretical and practical classwork throughout the course. Minimum entrance requirements, 2 years' High School work. Apply to Miss E. C. Burgess, Supt., Groveland & 29th St., Box 106, Chicago, Ill.
DE PAUL UNIVERSITY
LAW SCHOOL
708 Tower Building, 6 North Michigan Av., Chicago. Tel. Randolph 2169
Thirty-First Season
AMERICAN CONSERVATORY
JOHN J. HATTSTAEDT President
Chicago's Foremost School of
MUSIC
Offers modern courses in Piano, Voice, Violin, Organ, Public School Music, Harmony, Composition, Orchestral Instruments, Dalcroze Eurhythmics, Modern Languages, etc. taught by 80 eminent artists. Superior Normal Training School supplies teachers for Colleges, Teachers' Certificates, Diplomas and Degrees. Dormitory accommodations. Unrivaled free advantages.
WALTON PYRE
School of Dramatic Art and Expression. Stage Training, Public Reading, Physical Culture. Students may enter at any time. New catalog mailed free. Fall session begins Thursday, Sept. 7, 1916.
642 Kimball Hall, Chicago, Illinois
CHICAGO COLLEGE OF OSTEOPATHY
Most efficient Osteopathic College. Large clinics. Faculty unexcelled. Opportunities not obtainable elsewhere. For information write
REGISTRAR, 1428 W. Monroe St., Chicago, Ill.
MARY WOOD CHASE SCHOOL OF MUSICAL ARTS
MARY WOOD CHASE, President-Director
Fall session begins Sept. 11, 1916. Free catalog.
503 LYON & HEALY BLDG., CHICAGO
SPANISH ACADEMY OF LANGUAGES
1206, 116 So. Michigan Ave.
Join Our Class Now Forming for Aug. 1

Fig. 37. Other Things Equal, the Larger Advertisement Attracts First Attention.

times as good as a sixteenth-page advertisement, even though the former is four times as large as the latter. But it is *twice* as good.

To apply this principle practically, use space that is big enough to be seen. Very small advertisements seldom pay except in certain mail order lines. If a telephone company feels that it can afford, let us say, only 18 inches of space per week in a daily newspaper, it will be a more profitable investment to run one 18-inch advertisement once a week than it will to run six three-inch advertisements.

48. *Relevant and Irrelevant Illustrations.*—A psychological principle, which also might seem self-evident, is this: The power which any advertisement has to attract attention, depends upon the readiness with which we are able to comprehend it. In other words, advertising must force our attention. We very

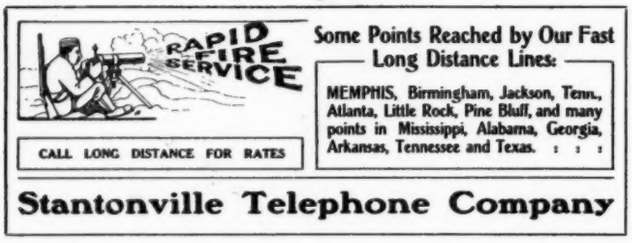

RAPID FIRE SERVICE
Some Points Reached by Our Fast Long Distance Lines:
MEMPHIS, Birmingham, Jackson, Tenn., Atlanta, Little Rock, Pine Bluff, and many points in Mississippi, Alabama, Georgia, Arkansas, Tennessee and Texas.
CALL LONG DISTANCE FOR RATES
Stantonville Telephone Company

Fig. 38. Irrelevant Illustration, May Apply to Other Industries.

seldom hunt for it voluntarily, as we would for a story. It must force itself to our notice.

Type or styles of lettering not easily read, or illustrations not readily understood, should be eliminated from all forms of advertising. This brings up the question of relevant and irrelevant illustrations, concerning which something has been said in a previous installment. A relevant illustration is one which has a direct bearing upon the subject at hand, explaining or making clear some point in the advertisement. An irrelevant illustration, on the other hand, is used simply for the purpose of attracting attention.

A picture of a woman using an extension telephone would be a relevant illustration. A picture of a frog jumping into a puddle of water, used at the top of a telephone advertisement, would be an irrelevant illustration because it has nothing whatever to do with the subject of telephone service. An irrelevant illustration which might be used with equal propriety for any one of a dozen different businesses is shown in Fig. 38.

Actual experiments in the laboratory have proved that irrelevant illustrations have less power to attract attention than relevant illustrations, a fact which has been amply borne out in advertising practice.

49. *Repetition and Methods Followed.*—The subject of repetition in advertising has likewise been thoroughly investigated. A saying, usually credited to John Wanamaker, is that "advertising does not jerk—it pulls." By this is meant that results are usually not secured by running an advertisement once.

One must keep pounding away on the same subject before

Print Your Own
cards, circulars, book,
small newspaper, &c. PRESS $5, Larger size $18, Rotary $60. Money saver and maker. For old or young, business or pleasure. Everything easy by printed instructions. Write to the factory to-day for illustrated catalog of presses, type, cards, paper, samples, etc. Address
THE PRESS CO., Meriden, Connecticut
EXCELSIOR

Fig. 39. Advertisement which has Changed but Little in Years.

noticeable results are achieved. Most of the things that are purchased as the result of advertising are bought because of the number of times they are presented to us. Repetition makes habit.

Repetition does not mean repeating the same advertisement over and over again, although some notable advertising successes have been achieved by following the plan. The trouble with it is that having seen an advertisement once, we are inclined to pass over it the second time it comes to our attention. Fig. 39 is the reproduction of an advertisement which is familiar to most of us. It has seldom been changed in the past twenty years—it must have paid. Running the same advertisement over and over again is the simplest form of repetition.

The most effective form of repetition is to make the advertisements distinctive and different and to link them all together by the use of some peculiar kind of type, border, or trademark, so that each advertisement couples up closely with all those that have run before. Such advertisements make use of the power of repetition and yet gain interest by their variety. The advertisements of the Tri-State Telephone & Telegraph Co. develop this power of repetition by using the Hepigrams illustrated in Fig. 32, TELEPHONY of July 29, page 27.

A department store in Chicago uses the same kind of distinctive border around all its advertisements, large or small.

Fig. 40. Border is Repetition Feature of this Store's Advertising.

(Fig. 40). This gives them the value of repetition—at the same time, each advertisement is different and distinctive. By using the Independent Shield (Fig. 34), a telephone manager can cash in on the power of repetition.

(To be Continued.)

Earnings of Manitoba Government Telephone System.

The net earnings of the Manitoba Government Telephone System, Manitoba, Canada, for the first half of the fiscal year, ended May 31, 1916, totaled $242,155, or the equivalent of practically 5 per cent. per annum on the government investment of $10,761,025. The total revenue for May was $151,599 and expenses $112,015, leaving net earnings for the month of $39,584.

Classification of Florida Telephone Companies.

The annual report of the Florida Railroad Commission for the year ended February 29, 1916, shows that there are two class A companies in the state operating 32 exchanges and serving 22,400 subscribers; one class B commany operating one exchange and serving 3,776 subscribers; 13 class C companies operating 30 exchanges and serving 7,730 subscribers; 63 class D companies operating 71 exchanges and serving 6,725 subscribers, a total of 79 companies of all classes operating 135 exchanges and serving 40,362 subscribers.

Practical Subjects—Letters and Discussions

"Telephony's" Home Course for Telephone Men and Wives.

(Not meant for study.)

By Well Clay.

When the evening sun with glory
  Has splashed the western sky
With a wealth of changing colors,
  And the twilight hours draws nigh;

When the workday and its worries
  Have faded quite away;
And the mystery of the gloaming
  Brings sweet fancy into play,

We love to sit and watch the rising
  Of the moon so silver bright,
And listen to the whisper
  Of the voices of the night.

Our soul comes from its chamber
  Where we prison it all day,
While the sordid cares of business
  Seem so very far away.

Just to sit and listen
  To the crickets' evening song,
And watch the darker shadows
  Of the treetops creep along;

To watch the glistening dewdrops,
  As they sparkle on the grass
Like diamonds strewn by fairies,
  Invisible as they pass,

'Tis hard believing yonder moon
  But reflects a borrowed light,
And harder still to go inside
  And bid such scenes good night.

Moonlight in Minnesota is, I suppose, the same as anywhere else, but like the water in rivers celebrated in song and story, it seems to be a little different—a little better. The main thing, however, is that it is the time which should be given over to reflection as we sit out in the evening, after a hard day's work, and let the tingling nerves and muscles calm down and recuperate. Then it is that the vagrant fancies, like mice when the house grows still, come out and scamper about, leading one a merry chase through the realms of imagination.

We travel on the wings of our mind whither we will, and the scope of our travels is larger than was the field of our fathers, because we are in touch daily with all the world. By means of the daily press, books, and lately, by means of that wonderful invention, the moving picture machine, we get all the news and know the thoughts of the peoples of other nations as well as recognizing almost at a glance what part of the world is pictured when we see the first picture on the screen.

How few though are the moments in which we deliberately sit down and think in a thoroughly rational way. What a world of good would come of a lot of really good logical thinking, coupled later with comprehensive action. Many of us are like an automobile standing still with the engine running. We step on the juice distributer once in awhile and are in a glow of satisfaction at the wonderful speed at which our minds travel. But so long as we do not throw the gears of ambition into contact with the wheels of action, we do not get ahead, but stand in the self-same spot until the gas gives out. Power unapplied is simply waste.

This morning I have been going about shooting trouble in an antiquated automobile, poor in looks but as comfortable to run as an old shoe. The weather has been very warm and I could tell what each person was going to say to me before they started to speak. I won't tell what the inquiry was—you might tell some one. The girls at the central office were pretty well taxed to keep cheerful under the burden of the weather and the tempers of the subscribers, and everyone was sticky, warm and languidly weary.

One place where I was obliged to call, was at the home of a prosperous farmer who lived on the edge of town. His wife was ironing in a close, hot kitchen, by the aid of coal fire. Think of it! Two small children were helping her. One was aged about two and the other three or four—some help. Their assistance was mainly hanging onto her skirts.

She was cheerful though, and didn't know she was not doing the right thing. There was a lighting and power circuit in front of the house, but I noticed kerosene lamps were used for lighting. Why was all this and what was the answer? They hadn't stopped to think. She was using more fuel than an electric iron and a fan would have consumed, so she was not saving anything.

They were well able to have all the modern conveniences, so far as their finances were concerned. They did have a telephone. They could have had an entire reversal of the stage setting in this case without any trouble at all. Why didn't they? The man would have been willing. The wife certainly wasn't doing all this for fun.

They simply had not taken time to sit down and think out a simple, logical plan which, coupled with a little intelligent action, would have resulted in greatly increased comfort. They didn't think. They didn't sit out under the trees on a summer night and rest. No indeed, they hurried off to bed as soon as possible so they could get rested up for another day of hard work. They would need it, unless they did some thinking and some planning which would set them free.

And even at that the amount of thinking they would be called upon to do was not great. There were no agonizing problems in mathematics to solve—only just a little thinking was required. They had the means and the minds to work with, but they never had learned what the levers of the mind were for. They hadn't learned that all they had to do in their case was to shift from the low gear of drudgery to the higher ones of convenience and comfort without sacrificing in any way the speed they were making towards the grave. Then the amount of their output would naturally increase. You know it.

Why didn't they take one evening off and sit out in the moonlight and let their minds have a chance, even if it did take a little priming of romance to start the wheels? Poof! Such carrying on is only meant for young folks and foolish people. People of stability have their work to do—no time for such nonsense.

If this had been a nice cool day I would have written something which had to do in some remote way with the telephone business, but as it is, I guess I won't bring the matter up at all.

APHORISM: Old prisoners need no locks.

Making Your Office a Producer.

By E. C. Constans.

In reading different telephone journals, convention proceedings, etc., we find mention made in almost every case, of all matters pertaining to the construction and operating end of the business—but very little, if any, of the accounting end. The result is that the construction and operating departments of the average company are far superior to the accounting department.

The writer has talked to a number of managers along these lines and must admit that there was very little interest shown. The only way to account for this lack of interest is the fact that the office has long been looked upon as a non-producer and a necessary expense. But in this day and age we must break away from old ideas and replace them with modern ones if we wish to keep up with the procession.

The average telephone company looks with horror upon the various reports required by both the state and Interstate commissions, regarding them as a matter of red tape. These reports and requirements that are automatically forced upon the companies, are really blessings in disguise. They have a tendency to bring the accounting end of the business into its own, as we are required to give more details every year. This forces us to keep a more comprehensive set of books, with the results that our books should mean more to us, other than to tell whether a profit was made during a certain period. Many managers will tell you that all they want to know is how much money they are making during the year, because they cannot afford to have a big office force to turn out all sorts of red tape.

When you meet a man of this type, get busy and do some missionary work. Try and impress upon him the importance of a good office. It is just this type that you'll have to convert, Mr. Man, because it is this type of manager whose rates are too low. He is behind the times and, unless he is educated, will do irreparable damage. "How?" you ask.

Well, we will say a man of this type is the manager of the exchange in the town adjoining yours. You are efficient and up to the minute. You not only make up figures, but you also make up statistics, and you learn from these statistics that your country service is not paying a fair return on the investment. You take the matter up with the commission and, as you have data supporting your contentions, you are allowed a raise in rates.

Your neighbor does not know whether he is making money in the county or not. He has no data—all he knows is that he is making a little money. Now if he applies for a raise in rates, the chances are against him for he has nothing to support his contentions. The result is that, while your higher rate is perfectly fair and just, your subscribers will think that they are getting beat, because the people in the neighboring town are getting service for less money.

This is just part of the damage the man without a good office can do to you, the man with a good office. So again I say, get busy and educate this type. You will find it a mighty fine investment of time.

When your books only tell you what you are making per year, they are an expense and your bookkeeper is a non-producer. When your books enable you to make up a comparative cost statement each month, showing the cost per station per month, with this cost further divided between city and country stations and a separate cost kept on each exchange—then you are working along the right lines. You will be able to take your office out of the expense and non-producer class and make a producer of it, provided you profit from the things brought to light by the cost statements. If you do profit by them, give the office credit for the actual money saved and see what a good investment a real office makes.

Now do not say to yourself: "Our company is not large enough to enable us to keep that kind of records." Get busy and devote a little time and thought to the office end of your business. You do not say that, because your plant is small, your construction should be inferior to the fellow with a larger plant. So get out of the rut of thinking you cannot prepare good working data showing just where you stand on your cost. The trouble is that you have been thinking that so long, you have never tried to make up a cost statement.

Lack of space makes it impossible for me to go into details, but one rule that I have always found to work is to make a careful study of your routine office work. If you will do this, you will be surprised to find out how much time you could save by using a different method. To show how this works out in actual practice, we will take the job of making out bills.

The company I have in mind has six exchanges, and as the rental was not collected in advance, almost every bill showed a balance. All of the book work was handled at the main office, all the bills being made out and mailed from there. As it was not practical to make the ordinary stub bill, owing to the time it would take, it was the custom to list each name and amount in alphabetical order, sending the list containing the Smithville subscribers to the Smithville exchange, etc. This really was a saving of time over the ordinary stub bill, and was also a saving of time as compared to making a carbon copy of each bill. But after making a careful time study of the work, the following system was worked out, resulting in a 40 per cent. saving on the billing work, besides giving a much better record:

I first made a careful study of the toll business and found that 90 per cent. of toll users had less than 10 calls per month. Therefore it was practical to use a combination toll and rental bill. Having arrived at this, I began experimenting with the addressing machine, and found that it was possible to make a carbon copy. After that the rest was easy, as we had some carbon-coated bills made up which opened on one side and were perforated on the other. These were handled in the following manner:

About the middle of the month the bills were run through the addressing machine, which put on the name, address, account number, rate, and date.

Where there is no addressing machine, I would suggest that this be written in by hand during the slack period of the month.

The bills were then delivered to the toll clerk, who simply entered her tickets on the toll part of the bill each day. At the end of the billing period, the completed toll bills were turned over to the bookkeeper who entered thereon the balance and added the bill up, thus completing the bill. The duplicates were then torn from the originals and the originals placed in open-faced envelopes and mailed to the subscribers.

The duplicates were sorted in alphabetical order, placed on files, and mailed to the various exchanges, thus giving to each exchange an exact copy of the bill mailed to each subscriber. Bear in mind that this duplicate was made without any additional cost whatsoever.

The file containing the duplicates was placed at the cashier's window. When a subscriber paid, it was detached and placed on a stick file. At the end of the week, these duplicates were placed in numerical order and the weekly report made up. Thus when the report was received at the general office, it could be posted in very little time, owing to the fact that all customers' accounts were kept in numerical order. Hence when posting a report, we could go right through the book without having to turn back to post Jim Jones after posting Bob Smith.

The foregoing is just an example of cutting down routine work to make way for special work that will pay big returns, not only to you, but to the entire telephone business. If this article has made you think of the office end of the business as a producer, instead of a necessary expense, it will have served the writer's purpose.

Queries on Theory and Practice

Current Through Supervisory Lamp.

It is stated in section 375 of TELEPHONY'S Home Study Course, with reference to the circuit shown in Fig. 143, "That whether the supervisory relay, *C*, is operated or not, the current through the cut-off relay, *B*, remains at the same strength."

In endeavoring to obtain a better understanding of the busy test conditions, the writer has redrawn that portion of the

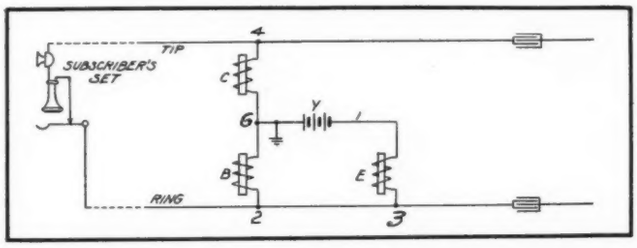


Fig. 1. Busy Test Circuit in Simplified Form.

circuit essential to the busy test in simplified form (Fig. 1) the corresponding relays being lettered the same as in Fig. 143.

It seems to the writer that the current through the cut-off relay, *B*, *would* change when the supervisory relay, *C*, is operated on the subscriber removing his receiver from the hook, as a shunt path around relay, *B*, would be formed as follows: From grounded side of cut-off relay, *B*, through subscriber's set, back over ring side of line to other side of cut-off relay winding.

Would not this lower the potential around, and consequently reduce the current flow through relay *B*? Does the apparently unbalanced condition of the talking circuit as shown have any bad effect in practice?

Section 375 as published is not clear. The wording should call attention more clearly to the fact it was the intention to emphasize, that the current which causes the supervisory lamp to become bright, is not drawn through any part of its circuit from one terminal of the common battery to the other outside of the confines of the cord circuit itself. Therefore, whether the *contact points* of the supervisory relay permit current to flow through the supervisory lamp or not will not, in itself, affect the strength of the current flow through the cut-off relay, *B*. The operation of the contact points of the *telephone instrument* switch hook on the other hand will, of course, affect the strength of the current flow through the cut-off relay, *B*.

The condition brought out as a result of the wording of section 375 is very instructive. The common storage battery in any telephone office may be assumed to be of such size as to supply the greatest demands likely to be made for current

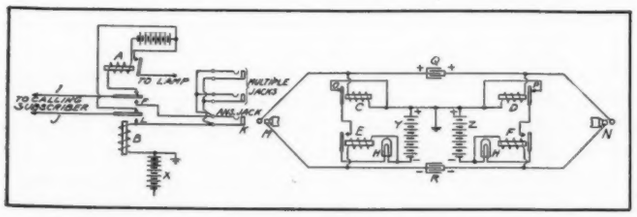


Fig. 2. Two-Wire Multiple and Two-Wire Cord Circuit.

without sensible reduction of voltage. Its resistance also may from a practical standpoint, be considered negligible.

Referring to Fig. 2 (Fig. 143), the resistance of the relay, *E*, may be fixed at 200 ohms, that of the relay, *B*, at 500 and relay, *C*, 200 ohms. It may be assumed that the resistance of the telephone line and instrument is 420 ohms. On this basis the strength of the current through the cut-off relay, *B*, may be easily calculated, both for the assumed condition with the telephone receiver off its hook as well as on it.

With the receiver off the hook the relative values of the various resistances and their relation to each other is shown in Fig. 3 The circuit from one terminal of the common battery to the other includes one resistance, *E*, of 200 ohms in series with a joint resistance, *B*. The joint resistance is composed of 500 ohms in parallel with one of 620 ohms (line and telephone). But the joint resistance of 500 ohms in parallel with 620 ohms is equal to their product divided by their sum or 276.78 ohms.

Now this joint resistance, 276.78 ohms, in series with 200 ohms, *E*, at a battery voltage of 40 volts will permit a strength of current flow of 40/476.78 or 0.0839 ampere current flow through the cut-off relay. But this is the total current strength flowing through the joint resistance of which only a portion flows through the cut-off relay, *B*. The joint resistance is composed of 500 ohms in parallel with 620 ohms.

The total current flowing through the combination is divided between the two elements in inverse ratio to their resistances. The 500-ohm resistance will carry, therefore, 620/1120 of the total (0.0839 ampere) or 0.046 ampere.

If it be assumed that the telephone receiver has been placed upon the hook, the one member of the joint resistance through the line and relay, *C*, will be opened. In this case, the

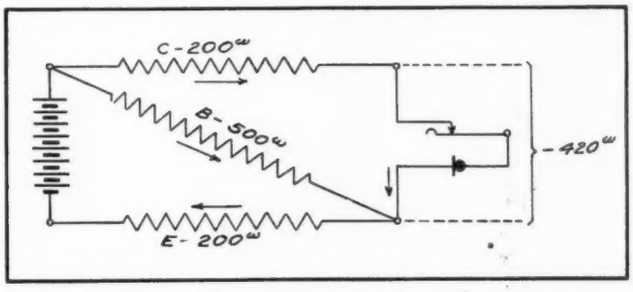


Fig. 3. Resistance Conditions for Circuit of Fig. 2.

strength of current flow through the cut-off relay is equal to 40/700 or 0.057 ampere.

The condition of the supervisory relay and therefore the supervisory lamp, whether it is bright or dark, does not *in itself* in any way affect the busy test. The condition of the circuit through the telephone line does affect it as has just been shown. Were the line longer and its resistance higher, the effect noted would be less. On the other hand the effect noted is bound to be more pronounced in the case of a short line of low resistance.

Reducing Humidity in Terminal Room.

Will you kindly give us some information on how best to reduce dampness in a terminal room? We refer to humidity, not to damp floors or poor drainage, although these might have something to do with it.

What have they done in New York lately during their extreme humidity?

Several methods have been used, all of which get results but differ in cost and attendance and therefore are of varying desirability. The simple circulation of the air by electric fans has been and is used in many places, especially if there are few or no persons working in the room. Sometimes a slight heating of the air combined with circulation gives the desired lowering of relative humidity. Usually if the relative humidity does not exceed 70 per cent. no trouble is experienced. Passing the circulated air

through trays of lime or other absorbent has been used and dries the air very well, but is somewhat expensive.

Perhaps the most satisfactory means is to pass the air through a chamber or passage where it is chilled enough to cause it to deposit the moisture which it contains. The cooling is accomplished by spraying the space with very cold water. The spray strikes a rough surface over which cold water is flowing. The air from the room or from outdoors passes through this space and is so chilled that it falls to go below the dew point, whereupon the moisture in it is deposited and mixed with the cooling water.

The cooling water is made cold by passing it through some refrigerator, such as a mass of ice or an ammonia refrigerator. The relative cost is probably in favor of the ammonia plant, unless the plant be too small.

Almost any of the companies that manufacture blowing and ventilating apparatus can give you detailed information as to the equipment.

We do not know what the New York people have done, but it is very likely that air circulation by electric fans is the chief remedy.

The Girl Behind the Voice.

We sing the man behind the gun,
The man behind the hoe,
The baker bold behind the bun,
The gent behind the show.

Once on a time such chaps could score,
Now they are second choice.
Prepare the place of honor for
"The girl behind the voice!"

Doc Dodges Showers.

Dr. Foster went to Gloucester
In a shower of rain,
The Docs today, relieve, they say,
By telephone, the pain.

Personal Items of Interest to the Operating Field

S. A. LINDSEY is president of the Gulf States Telephone Co. and the Athens Telephone Co. His home is in Tyler, Texas, where his telephone properties have their headquarters. Mr. Lindsey is known as "Judge" by his friends—and there are many of them.

S. A. Lindsey.

Judge Lindsey is a really "self made" man. Obtaining an education entirely through his own efforts, he taught school for a while in his younger days, studying law the meanwhile, and made a reputation as a lawyer after his admittance to the bar.

Venturing into the telephone business as a sort of a side line, his capable management of a few small properties brought them soon to such large proportions that they required all of his time. Now, with a large and efficient organization in charge of his telephone interests, the Judge has also become a banker of renown in his territory.

He has held many important public positions, and could hold many more if he desired. He is pretty well known all over Texas, and has a warm spot in his heart for every Independent telephone man. In his summer home, on the banks of a beautiful lake a short distance from his home town, the Judge keeps open house for Independent telephone men, many of whom have enjoyed his kindly hospitality.

Judge Lindsey is an energetic Independent association worker, and a mighty good telephone man. When there is anything doing for the benefit of Independent telephony in Texas, you'll find Judge Lindsey in the thick of it. His companies operate over a large territory in central and eastern Texas.

A. V. EMERSON, of Florence, Kans., has been made district manager of the Arkansas Valley Telephone Co., with headquarters at Great Bend, Kans.

CHARLES DICKEMAN, of Talmage, Neb., has been appointed manager of exchange of the Lincoln Telephone & Telegraph Co. at Syracuse, Neb., succeeding J. W. Taylor.

J. W. TAYLOR, manager of the Syracuse, Neb., exchange of the Lincoln Telephone & Telegraph Co. for the past two years, has been promoted to the managership of the company's exchange at College View.

C. J. LARSEN, service engineer of the Eastern Pennsylvania Independent Telephone Association, has resigned, effective August 1, to become equipment and transmission engineer of the Kansas City Home Telephone Co., Kansas City, Mo. Prior to his connection with the Eastern Pennsylvania association, Mr. Larsen was engineer for the Consolidated Telephone Co., of Allentown, Pa.

JOHN Z. MILLER, manager of the Mutual Telephone Co., or Erie, Pa., has been appointed receiver for the Union Telephone Co., of Erie, succeeding T. A. Lamb. Mr. Miller believes the prospects for an early liquidation of the bankruptcy are bright. "Possibly within the six months," he states, "matters will have been completely adjusted."

F. O. HALE, chief engineer of the Southwestern Bell Telephone & Telegraph Co., has been appointed general manager of the Southwestern Telegraph & Telephone Co., with headquarters in St. Louis, Mo. He succeeds W. J. Hiss, who resigned as general manager of that company a short time ago to go with the American Telephone & Telegraph Co., at New York.

E. B. THROCKMORTON, who for a number of years has been general superintendent of the South Penn Telephone & Telegraph Co., at Waynesburg, Pa., has purchased the Mt. Morris Telephone Exchange Co., at Mt. Morris, Pa., and will assume full charge November 1. Mr. Throckmorton entered the telephone field 30 years ago when, as general merchant at Rogersville he organized the Standard Telephone Exchange, with offices at his store and giving service west of Waynesburg.

In 1898 Mr. Throckmorton went to Waynesburg and established an exchange which grew and prospered in spite of brisk competition with the Bell company. In 1902 he sold a half interest in the plant to his brother, James R. Throckmorton, and they continued the business as the Standard Telephone Exchange Co. until 1905. In October of that year they formed a stock company among the local business men, under the name of the South Penn Telephone & Telegraph Co., which entered into an agreement with the Bell company for an exchange of connections, the South Penn taking over the Greene county offices of the Bell.

Mr. Throckmorton will remain in charge of the South Penn company until November 1, or until a competent man can be secured as his successor. Mr. Throckmorton himself organized the Mt. Morris company more than fifteen years ago and later sold it to Mt. Morris parties.

New England Company to Issue Stock.

The directors of the New England Telephone & Telegraph Co. have voted to issued additional stock to provide funds for property extensions and for the growth of the business necessitated by public pressure for increased facilities. Stockholders of record August 15 will be entitled to subscribe for one new share at $100 par for every six shares held.

As of December 31 last there was outstanding $47,346,300 stock, so that the new financing contemplates the issuance of $7,891,050.

Regarding this announcement, President Philip L. Spalding says: "The new issue, if entirely subscribed for, will provide about $7,900,000 of new money. The unusual and unexpected increase in business has necessitated large expenditures for telephone plants of all kinds, buildings, switchboards, cables, wires, instruments, etc. For the first six months of this year, more than $3,000,000 has been spent for construction and additions to property—a sum in excess of the total expended in 1915.

"The company has done no financing since 1912, when there was issued approximately $4,000,000 of capital stock and $10,000,000 of debenture notes. The new capital stock will provide for refunding and permanently financing all outstanding short-term obligations and, in addition, will provide a reasonable amount of capital necessary for the completion of construction work in the near future, which will be needed to meeet the demands of the public for telephone service."

June Report of Chicago Telephone Co.

The June report of the Chicago Telephone Co. showed a gain of 47,800 stations or an increase of 9 per cent. over June, 1915, making a total of 530,853 stations in service on June 30, 1916. The operating revenues showed an increase of $206,152 or 12 per cent. over June, 1915. The operating income showed an increase of $106,050, or 25.9 per cent. over the same month last year. The figures for June of this year compare with those of the same month for 1915, as follows:

		Increase Over June, 1915.
Number of company stations in service at end of month	530,853	47,800
Telephone operating revenues	$1,677,964	$206,152
Telephone operating expenses	1,173,974	91,482
Net telephone operating revenues	503,990	114,660
Uncollected revenues, taxes	94,779	8,609
Operating income	409,211	106,050

June Statement of New York Telephone Co.

The New York Telephone Co. reports its total operating revenue for June as $1,182,208, an increase of $482,250. The operating income is $1,504,810, an increase of $262,255. The total operating revenues for the six months ended June 30, are $26,123,767, an increase of $2,384,752. The operating income for this period is $8,015,889, an increase of $1,369,341.

Earnings of Ohio State Company for June.

The Ohio State Telephone Co., of Columbus, Ohio, reports a net income of $129,230 for the month of June as against $104,044 in June of last year. The net earnings were $82,847 as against $57,026 in June, 1915. The balance available for depreciation, financial requirements and dividends on common stock was $56,759 as against $30,938.

"More Sunlight" Plan Adopted by Western Union in Dallas.

The "add an hour," or "more sunlight" plan recently adopted by statute in England and other European countries has been tried out successfully in the general offices of the Western Union Telegraph Co. in Dallas, Texas. The plan was inaugurated in the offices of the telegraph company several weeks ago and according to general officials of the company, is entirely successful, and employes are enthusiastic over it. The clock has been moved up one hour during the summer, employes reporting for duty an hour earlier and leaving at 4 o'clock in the afternoon instead of 5 o'clock as formerly.

"The practice has been adopted permanently by us," said General Manager S. P. English of the telegraph company, "as it has proven satisfactory both to the company and to the employes."

The Chamber of Commerce and Manufacturers' Association of Dallas are energetically advocating the inauguration of the "more sunlight" plan in other business institutions in that city.

The Buffalo, N. Y. Merger.

C. A. Spaulding, manager of the New York Telephone Co. in Buffalo, N. Y. has submitted to the Buffalo city council a corrected statement of the favorable vote on the Bell-Federal merger proposition as secured by the telephone companies from their subscribers and checked by an audit company. It appeared that the audit company in its checking neglected to deduct certain duplications. The deduction presents an even more favorable percentage for the merger than previously was reported to the council.

The amended statement shows that 55.71 per cent. of the 40,259 individual telephone users signed petitions for the merger. This, the companies claim, indicates a preponderence of sentiment in its favor from persons chiefly concerned, since it is an active support while the minority percentage that did not sign is not necessarily opposed but includes indifferent telephone users as well as oppon-

Quick Work in Restoring Service at Kincaid, Kan.

The exchange of the Eastern Kansas Telephone Co., at Kincaid, was recently destroyed by fire. Forty minutes after the central office had been abandoned, Manager Parsons had made long distance connections with Kansas City and within an hour a new switchboard had been ordered. The switchboard arrived on the afternoon train and the work of installing it in temporary quarters was immediately begun and service restored in a short time.

Plant Additions Planned for Reading, Pa.

The Bell Telephone Co. of Pennsylvania has approved an appropriation of $50,000 for additions and betterments to its plant in Reading, Pa., and the immediate vicinity. The contemplated new plant additions include the placing of 65,600 feet of lead sheath cable, ranging in capacity from 25 to 433 pairs of wires per cable and the construction of a new toll cable between Reading and Hill Crest.

Dividends Paid to Employes of Lincoln T. & T. Co.

According to a statement made by officials of the Lincoln Telephone & Telegraph Co., of Lincoln, Neb., $3,515 of the earnings of the corporation are now paid yearly in dividends to employes who have bought stock in the company under a monthly installment payment plan. There are 202 employes who hold 505 shares or $50,500 worth of the stock.

Picnic of Cleveland Division of Ohio State.

The Cleveland division of the Ohio State Telephone Co. held its annual picnic at Euclid Beach Park on August 9. A full program of interesting events was carried out and all the amusement features of the park, such as the "figure eight," "aerial swing," "carrousel" and "flying ponies," were enjoyed by the telephone people.

Strange But True.

Very sweetly the wise girl at "Central" says "Number Please?" to the old grouch when she already has his number.

From Factory and Salesroom

Conventions: Indiana Independent Telephone Association, Indianapolis, September 14-15; United States Independent Telephone Association, Chicago, December 5-8

Frank B. Cook Co. Issues New Catalog.

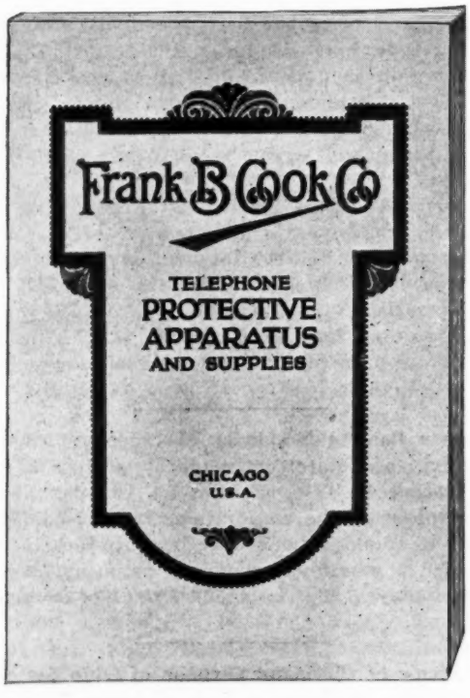
The Frank B. Cook Co., now has ready for distribution its new catalog which has been some months in preparation. Although referred to as a catalog, this book is really a compendium of information on the subject of telephone protection, concerning which comparatively little has ever been written.

In addition to listing the various units of the Cook line, the book contains general articles on "The Importance of Telephone Protection," "Central Office Protection," "Accurate Telephone Testing," "Sub-Station Protectors," "Lightning Arresters," "Fuses," "Pole Cable Terminals," etc.

Telephone men who have grown accustomed to depending upon the "Little Brown Book" for their information regarding telephone protection, will be glad to know that the new Cook catalog is also brown, although its size and general appearance have been altered. It is a little larger, considerably handsomer, and much more convenient to use. The illustrations are large and unusually distinct, so a very good understanding can be had of the various pieces of Cook equipment merely by examining the illustrations.

Several pieces of new equipment have been added to the Cook line, three new central office protectors, several substation protectors, a new lightning arrester, etc. These are all illustrated and described in the new catalog.

Telephone men will find much useful information in this

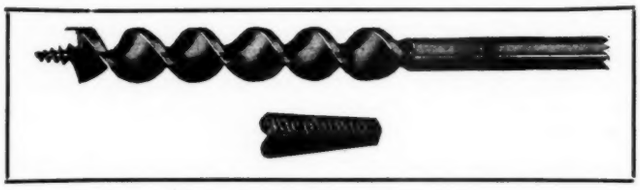


Cover of New Cook Catalog.

new catalog. A copy will gladly be sent postpaid simply by addressing the Frank B. Cook Co., 326 West Madison Street, Chicago.

"Mephisto" Telephone Installer's Special Bit.

The W. A. Ives Mfg. Co., the factory and home offices of which are located at Wallingford, Conn., has placed on the market a special bit for telephone purposes, which is receiving the endorsement of some of the leading engineers in the country. This firm specializes exclusively on various forms of bits and tools and it has excellent facilities for designing tools of this sort. Not only has this new telephone installer's special bit been approved



The Mephisto Telephone Bit.

by many engineers, but the installing men, it is said, have particularly pronounced it to be the best bit they have ever used.

The Mephisto telephone bit, as it is called, has only one floor lip and one side creaser. The simplification of the bit and its consequent elimination of friction are two of its attractive features. C. J. Benham, who is president of the company, states that a thread could not be cut with two floor lips in which the last thread of the screw will match both floor lips.

The new style bit is readily sharpened, whereas the old style bit with the two lips in many cases had to be resharpened by the original manufacturer. The new Mephisto bit, it is said, will bore in any kind of wood and against any grain. It has a regular crimp like an auger bit with plenty of stock. This bit has been adopted by the Western Electric Co. and is absolutely guaranteed to give satisfaction.

R. M. Smith, supervisor of one of the leading manual training schools of Chicago, has highly endorsed its efficiency. The company has an output of 3,500 bits daily and occupies one of the principal factories of Wallingford, Conn.

The firm back of the Mephisto telephone bit is a guarantee of its success, as the Ives company is acknowledged to be one of the leaders in the hardware trade for this special form of tools.

Fire Insurance For Public Utilities.

Lynton T. Block announces that on July 31 the Utilities Fire Indemnity Exchange, Railway Exchange Building, St. Louis, Mo., commenced writing fire insurance policies on the property of public utilities and electrical contractors. For several years the Utilities Indemnity Exchange has been accepting fire insurance and placing it as advantageously as possible for the public utility industry. Through its efforts a saving of over 25 per cent. on the cost of their insurance has been effected. The experience on the business written, however, proved that the lines served by the exchange were bearing an undue proportion of the fire losses. Accordingly as soon as the proper amount of business has been secured, a separate exchange was started.

The management will be the same as the Utilities Indemnity Exchange which has for some years specialized in liability and compensation insurance for public utilities. The feasibility of the exchange was demonstrated conclusively by the investigation made by David L. Gaskill, secretary of the Ohio Electric Light Association. The movement grew out of the fact that

the old line stock companies refused to give any relief to the moderate-sized light plant through suitable reduction in cost.

Special study has also been given the many restrictive clauses now contained on policies covering electrical machinery and apparatus and the new exchange will write as liberal a policy as is consistent with good underwriting.

New Edition of Bakelite Receiver Booklet.

Recently the Kellogg Switchboard & Supply Co., of Chicago, mailed the last of an edition of ten thousand copies of its Kellogg Bakelite receiver booklet. The company has just received from the printer a new edition, revised and brought up to date. Copies of this new booklet will be sent to interested telephone men on request.

This booklet, like many Kellogg equipment publications, is unique, being accurately die cut to the shape of the standard Kellogg receiver for subscribers, as indicated by the accompanying illustration. The inside pages show borders as half section views of the receiver shell. A comprehensive, yet brief history of *Kellogg Bakelite* and its advantages is given with several interesting views of apparatus; a cross section of a Kellogg Bakelite transmitter mouthpiece, an operator's receiver,

Reproduction of Cover of Kellogg Receiver Booklet.

and several views of receiver shells in the making. This little booklet is said to be well worth sending for by telephone men anxious to reduce their receiver maintenance.

A Test of the Faultless Anchor.

Through an accident on an electric railway, near Arcadia, Ohio, a big new steel interurban car was left flat on its side in a ditch. Numerous expedients to right it and get it on the tracks were tried without result. Then a Faultless guy anchor was secured and the car was shortly thereafter on the tracks.

A Faultless anchor of large size, having a one-inch strain rod, was planted opposite each end of the ditched car—on the opposite side of the track therefrom. Heavy block and fall tackle equipped with large steel cable was then connected between the anchor and the end of the interurban opposite. The pull was made by means of a sister car up the track. By alternating the pull first on one and then on the other end of the fallen interurban, it was dragged up to the track. Then a mighty strain was applied and the 30-ton passenger coach was turned over to "right side up." It is stated that the anchor did the work with ease for it was immediately taken out of the ground and showed not one sign of what it had undergone.

The Faultless Anchor Co., Fostoria, Ohio, is quite pleased with the manner in which the anchor acquitted itself in this unexpected test of its holding powers. Its main purpose, however, is for the guying of telephone, telegraph and electric light poles, against the strains produced by winds, sleet, etc. Full information regarding the Faultless anchor will be sent upon request.

"Bessie's Burglar."

The advertising department of the Stromberg-Carlson Telephone Mfg. Co. is bringing out a new stunt in picture slide publicity. It is a five-act drama entitled "Bessie's Burglar." Slide No. 1, like all high-grade "movie releases," is an announcement of the drama, and gives the names of the stars of the cast, who is responsible for the scenario, staged under the direction of, etc.

Act. No. 1 shows the burglar sizing up the premises, and in the act of jimmying up a window; also Bessie being awakened by the rudeness of the burglar. She thinks fast, of course. Most any of us would under similar circumstances, and the second act shows her using her extension telephone in calling the police station. Like all well-regulated police they respond promptly, and "Bessie's Burglar" is capture.

The policeman is not slow to praise "Bessie" for her good judgment in calling the station so quickly, and particularly complimenting her on the good judgment used in having a means of such quick communication as an extension telephone. These later features are shown in an interesting way in Acts 3 and 4.

These slides whenever shown cannot help but create in the minds of the audience "good thing—guess I had better get one." This is a departure from the old cut and dried single slide announcement. It creates and holds interest and tells the story of extension telephone advantages in a manner not easily forgotten.

These slides are being prepared at considerable expense, and will be ready for distribution to telephone companies within a short time.

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

New Companies and Incorporations.

KILBOURNE, ILL.—The Kilbourne Telephone Co. was incorporated recently with a capital stock of $1,000.

PEARL CITY, ILL.—The Pearl City Mutual Telephone Co. was incorporated with a capital stock of $5,000.

BEAVERTON, MICH.—The Farmers Telephone Co. was incorporated recently with $450 capital stock.

WINONA, MINN.—The Suburban Telephone Co. was incorporated recently with a capital stock of $5,000.

PARIS, TENN.—The Consolidated Telephone Co., of Henry County, Tenn., has applied for a charter with $10,000 capitalization.

CHINA SPRINGS, TEX.—The China Springs Telephone Co. has been incorporated with a capital stock of $2,232. The incorporators are T. N. Curtain, D. G. Stewart and Frank Walker.

WELLS RIVER, VT.—The Connecticut Valley Telephone Co., Inc., was incorporated recently for $50,000.

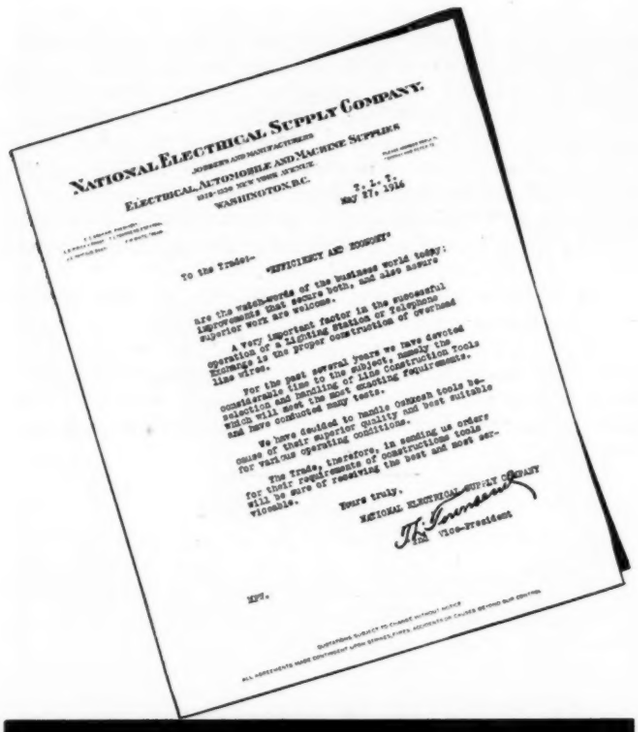
GOLDENDALE, WASH.—The Dead Canyon Telephone Co., of Klickitat county, has been incorporated with $2,000 capital stock. R. A. Johnson is one of the incorporators.

Construction.

GLOBE, ARIZ.—The Mountain States Telephone & Telegraph Co. will spend about $100,000 in improving its system in this city. The construction work planned includes the placing of most of its lines in cables.

FLAXTON, N. D.—The Farmers & Merchants Telephone Co. is constructing between 30 and 40 miles of new telephone circuits.

ERIE, PA.—At a recent meeting of the directors of the Mutual Telephone Co., improvements totalling $35,600 were author-


NATIONAL ELECTRICAL SUPPLY COMPANY
JOBBERS AND MANUFACTURERS
ELECTRICAL, AUTOMOBILE AND MACHINE SUPPLIES
WASHINGTON, D.C.
To the Trade:-
"EFFICIENCY AND ECONOMY"
are the watchwords of the business world today; improvements that secure both, and also assure superior work are welcome.
A Very important factor in the successful operation of a lighting station or telephone exchange is the proper construction of overhead line wires.
For the past several years we have devoted considerable time to the subject, namely the selection and handling of line construction tools which will meet the most exacting requirements.
We have decided to handle oshkosh tools because of their superior quality and best suitable for various operating conditions.
The trade, therefore, in sending us orders for various styles of construction tools will be sure of receiving the best and most serviceable.
Yours truly,
NATIONAL ELECTRICAL SUPPLY COMPANY
Vice-President
TT.

From an Oshkosh jobber to his trade

Here is real co-operation. Mr. Townsend thought well enough of OSHKOSH tools to make a special announcement to their old and established trade — so, we're backing him up, and every one of the other OSHKOSH jobbers by giving them the very best construction tools made.

OSHKOSH jobbers are scattered all over the United States, and every branch of the Western Electric handles the OSHKOSH line, too.

As far as you're concerned, your own opinion is the most valuable, so, send for a catalog—NOW.

OSHKOSH MFG. COMPANY

OSHKOSH, : WIS.

TRADE OSHKOSH MARK

Your neighbor is an OSHKOSH jobber, want his name?

ized to be made in the near future. The present two-story exchange building will be enlarged to three stories, at a cost of about $18,000, while additional switchboard equipment will be installed at a cost of $17,500, to give facilities for 1,000 additional telephones.

OIL CITY, PA.—Plans are being made by the directors of the Petroleum Telephone Co. for the erection of a new and modern exchange building.

MILWAUKEE, WIS.—A building permit has been issued to the Wisconsin Telephone Co. to erect a main office building in this city at a cost of $700,000. The structure will be eight stories in height, 120 by 120 feet in dimensions and will be built throughout of steel and reinforced concrete.

Underground.

JEFFERSONVILLE, IND.—The Southern Telephone Co. of Indiana has petitioned the Jeffersonville city council for permission to place its wires in underground conduits on several of the city streets. The work contemplated will entail an expenditure of $10,000.

Financial.

LEXINGTON, KY.—The Fayette Home Telephone Co. has declared a quarterly dividend of 1½ per cent., payable August 1.

MAYSVILLE, Ky.—The Maysville Telephone Co. has increased its capital stock from $5,000 to $50,000.

INDIANAPOLIS, IND.—The (new) Indianapolis Telephone Co. has declared an initial quarterly dividend of 1½ per cent. on its preferred stock, payable August 1.

NEBRASKA CITY, NEB.—O. G. Neidigh, of Nebraska City, and H. T. Glessner, of Ohio, have presented an ordinance to the city commissioners, asking for a 99-year telephone franchise to construct and operate a telephone system in Nebraska City.

TOWANDA, PA.—At a recent meeting of the Bradford County Telephone Co. the directors declared a quarterly dividend of 2 per cent., payable to all stock of record June 30.

Elections.

WEST LEBANON, IND.—At the annual meeting of the Cadwallader Telephone Co. new officers were chosen for the ensuing year as follows: J. H. Brenner, of West Lebanon, president and manager; Ira Evans, of West Lebanon, secretary-treasurer. The new directors are as follows: C. L. Messner, Ira Evans, J. H. Brenner, A. J. Johnson and Frank Neville.

OXFORD, IOWA.—The Eastern Iowa Telephone Co. recently re-elected its board of directors for the ensuing year, and the board in turn re-elected the old officers as follows: F. B. Kimball, Chicago, president and general counsel; F. H. Crow, Oxford, secretary and general manager; C. S. Crow, Williamsburg, treasurer. These officers, together with L. M. Crow, of Oxford, and Horace Kimball, of Iowa City, constitute the board of directors.

COLUMBIA, PA.—The annual meeting of the Columbia Telephone Co. was held recently and the following directors re-elected for the ensuing year: Mrs. E. F. Young, C. E. Taylor, Dr. S. S. Mann, C. E. Lenig, H. M. Hall, S. W. Hinkle and C. L. Filbert. The directors organized by re-electing these officers: President, Mrs. E. F. Young; secretary-treasurer, C. E. Taylor; chairman of executive committee, Dr. S. S. Mann; general manager, H. A. Oberdorf; superintendent, H. W. Marks.

BROOKLYN, WIS.—At the annual meeting of the Brooklyn Telephone Co. the officers were re-elected for the ensuing year, as follows: A. Crahen, president; R. S. Gillies, vice-president; J. Millspaugh, secretary and treasurer. James Root and C. H. Walker were elected to the board of directors.

Miscellaneous.

YELLVILLE, ARK.—The Southwestern Telegraph & Telephone Co. is building a copper metallic telephone line along the Yellville, Rush and Mineral Belt Railroad to the Rush mining camp.

MINCO, OKLA.—J. M. Simpson has sold the local telephone exchange to S. J. Bennett, of Waxahachie, Tex.

Specializing in Telephone Appraisals

O. MORSMAN

344 Monadnock Block, Chicago

Consulting Telephone Engineer